Supreme Court, U.S.
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No. _____

In the Supreme Court of the United States

DR. JOHN J. OKULEY,

Petitioner,

v.

E.I. DU PONT DE NEMOURS,

Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Sixth Circuit

PETITION FOR WRIT OF CERTIORARI

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QUESTIONS PRESENTED

1. Whether a plaintiff's claim to ownership of a patent where inventorship is disputed invokes a question of patent law and therefore the appellate jurisdiction of the Court of Appeals for the Federal Circuit?

2. Whether it is necessary to first construe the subject matter and define the inventor of a patent before determining the patent's ownership?

PARTIES TO THE PROCEEDING

The only parties to the proceeding are named in the caption.

Petitioner is Dr. John Joseph Okuley, an individual and citizen of Ohio.

Respondent is E. I. du Pont de Nemours, a Delaware corporation, with its principle place of business in Delaware.

CORPORATE DISCLOSURE STATEMENT

Petitioner is an individual.

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OPINIONS BELOW

The Order of the United States Court of Appeals for the Sixth Circuit denying a petition for rehearing *en banc* appears in Appendix A. The opinion of the Sixth Circuit is reported at 344 F.3d 578 and appears in Appendix B. The opinion of the District Court is unreported and appears in Appendix C.

STATEMENT OF JURISDICTION

This Court has jurisdiction under 28 U.S.C.§1254(1) over this appeal from the judgment of the United States Court of Appeals for the Sixth Circuit.

The Sixth Circuit's opinion was entered on September 17, 2003. Petitioner timely filed a petition for rehearing and petition for rehearing *en banc* on October 1, 2003. The petition for rehearing was denied in an order dated November 21, 2003.

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

U.S. Constitution, Article I, §8, cl. 8, which provides: "The Congress shall have the Power...To Promote Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

28 U.S.C. § 1295 (2002) Jurisdiction of the United States Court of Appeals for the Federal Circuit

(a) The United States Court of Appeals for the Federal Circuit shall have exclusive jurisdiction -

(1) of an appeal from a final decision of a district court of the United States, the United States District Court for the District of the Canal Zone, the District Court of Guam, the District Court of the Virgin Islands, or the District Court for the Northern Mariana Islands, if the jurisdiction of that court was based, in whole or in part, on section 1338 of this title, except that a case involving a claim arising under any Act of Congress relating to copyrights, exclusive rights in mask works, or trademarks and no other claims under section 1338(a) shall be governed by sections 1291, 1292, and 1294 of this title;

28 U.S.C. § 1338 (2002). Patents, plant variety protection, copyrights, mask works, designs, trademarks, and unfair competition

(a) The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trademarks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases.

28 U.S.C. § 2201 (2002). Creation of remedy

(a) In a case of actual controversy within its jurisdiction, except with respect to Federal taxes other

than actions brought under section 7428 of the Internal Revenue Code of 1986, a proceeding under section 505 or 1146 of title 11, or in any civil action involving an antidumping or countervailing duty proceeding regarding a class or kind of merchandise of a free trade area country (as defined in section 516A(f)(10) of the Tariff Act of 1930), as determined by the administering authority, any court of the United States, upon the filing of an appropriate pleading, may declare the rights and other legal relations of any interested party seeking such declaration, whether or not further relief is or could be sought. Any such declaration shall have the force and effect of a final judgment or decree and shall be reviewable as such.

STATEMENT OF THE CASE

This case is a dispute between a university scientist and corporate collaborators over the inventorship and ownership of a valuable gene and its uses for engineering plants. In 1992, Defendant-Petitioner Dr. John J. Okuley (Okuley) discovered the gene encoding a crucial enzyme in plant metabolism known as "FAD2." App. B at 4a-5a. The enzyme is of a type known as a "fatty acid desaturase," and the enzyme directly controls the level of polyunsaturation in a wide variety of edible oils. Continuing his work, in 1993, Dr. Okuley demonstrated that this gene can be used to alter the quality of oil produced by plants. App. F at 120a-122a. Federal grants funded Okuley's work. Based on Okuley's discoveries, genetically engineered plants have since been created that produce vegetable oils healthier for human consumption. U.S. Patent No. 6,372,965.

Following Okuley's discoveries, a collaborator, Plaintiff-Respondent E.I. Du Pont de Nemours & Co.

(DuPont), sought patents based on his discoveries, relying on a contract with Okuley's employer, Washington State University (WSU). The patent applications disclosed Okuley's inventions, along with additional supporting data generated by DuPont scientists. App. B at 5a. DuPont, at first, did not name Okuley as an inventor on the first patent application covering the 1992 work, but later moved to correct the designation. Id. DuPont eventually filed four patent applications claiming priority to either Okuley's 1992 discovery of the FAD2 gene or to his subsequent 1993 discovery of genetically engineered plants.[1] Okuley executed an assignment in favor of DuPont covering the first application, 1043. Okuley and DuPont stopped cooperating after 1993 when they were unable to reach an agreement on compensation for Dr. Okuley's contributions to the patent applications. App. B at 5a.

In 1997, DuPont filed suit in federal district court seeking a declaratory judgment that Okuley was required to assign to DuPont his rights in his inventions, specifically Okuley's 1992 discovery of the DNA fragment representing the FAD2 gene and also his 1993 invention using the FAD2 gene to genetically engineer an oil producing plant. Id; Complaint, at App. D.

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[1] The applications were identified by attorney docket numbers 1043, 1043A, 1043B, and 1043D. See R.56 Aff. of Christenbury at ¶2-4. Applications 1043A and 1043B are continuation-in-part patent applications, and 1043D continues application 1043A. A continuation-in-part application is a procedural device of the PTO for applications that contain some subject matter disclosed in a prior pending application, but adding additional new subject matter not disclosed in the prior application. 37 C.F.R. 1.53(b).

Dr. Okuley counterclaimed seeking a declaratory judgment that there were at least two inventions, and that he is the sole inventor and sole owner of the inventions. Answer, at App. E. In particular, Okuley contended that he had never assigned and was never obligated to assign the new subject matter he had disclosed in the continuation-in-part applications. Okuley also averred that he had never had an obligation to assign any invention to DuPont and that the assignment DuPont had induced him to execute was therefore void. Okuley's counterclaims named WSU but the district court dismissed WSU from the suit for want of jurisdiction.

After extensive discovery, both parties filed motions seeking summary judgment. The District Court granted DuPont's motion and denied Dr. Okuley's. In its Memorandum and Order granting DuPont's motion for summary judgment, the Court stated that it lacked jurisdiction to determine inventorship. See Order, App. C at 37a-41a. In spite of its belief that it lacked jurisdiction to determine inventorship, the Court proceeded to determine ownership of the inventions. Id. at 45a-63a.

Dr. Okuley timely appealed the district court's order and judgment to the Sixth Circuit, and subsequently filed his proof appeal brief. One of the errors Okuley cited in his appeal brief was the district court's conclusion that it had no jurisdiction to decide inventorship questions. After filing his proof brief, Okuley discovered that because the appeal sought review of DuPont's patent law claims, the appeal should have been filed with the Court of Appeals for the Federal Circuit. Okuley filed a Motion To Transfer with the Sixth Circuit. App. B at 6a. DuPont opposed the transfer. A Sixth Circuit motions panel deferred ruling on the Motion to Transfer to the panel hearing on the merits and directed briefing to continue.

After the case was briefed, but prior to oral argument, patent application 1043D issued as U.S. Patent No. 6,372,965 ('965 patent) and this Court's decision in Holmes Gr., Inc. v. Vornado Air Circ. Sys., Inc., issued. 535 U.S. 826. (2002). At oral argument before the Sixth Circuit, the parties disputed the court's jurisdiction over the appeal. On September 17, 2003, the Sixth Circuit ruled that it had jurisdiction over the appeal and affirmed the district court on all counts. App. B at 4a.

REASONS FOR GRANTING THE WRIT

This case directly bears on the breadth of the jurisdiction of the United States Court of Appeals for the Federal Circuit and, in effect, on the exclusive jurisdiction of the district courts to entertain questions arising under the patent laws. For more than twenty years inventors, patent holders, and industry have enjoyed the benefit of nearly uniform application of patent law based on the precedents of this Court and the Federal Circuit. The first question presented asks this Court to resolve current conflicts surrounding difficult jurisdictional question of when a complaint "arises under" federal law, and in particular, patent law. The questions presented also ask this Court to resolve a conflict between the circuits as to whether a district court must first ascertain that the true inventor is before them before ordering the transfer of the ownership of an invention from a putative inventor to a third party, and thus invoke the exclusive jurisdiction of the federal courts.

This case provides the Court with an opportunity to define the extent to which disputes "arise under" the patent laws, delimit the breadth of the appellate jurisdiction of the Federal Circuit, and resolve a conflict in interpretation of patent law among the Circuits.

I. There is conflict among the Circuits in delineating the breadth of jurisdiction of the Federal Circuit and when a controversy arises under patent law.

In applying this Court's decision in Holmes Gr., Inc. v. Vornado Air Circ. Sys., Inc., the various interpretations of "arising under the patent laws" are an unsettled question of law that is of general interest to the technology industry. 535 U.S. 826, 834, n.4 (2002). Christianson v. Colt Operating Indus. directed federal courts to look to a plaintiff's well-pleaded complaint to determine whether a plaintiff's claim or right to relief was based on resolution of a substantial issue of patent law. 486 U.S. 800, 809 (1988). As this Court noted in Christianson, the breadth of the "arising under" jurisdiction granted by §1338 "masks a welter of issues regarding the interrelation of federal and state authority and the proper management of the federal judicial system," and the delineation of the breadth of federal jurisdiction requires "sensitive judgments about congressional intent, judicial power, and the federal system." 486 U.S. at 809 n.2 quoting Franchise Tax Board of California v. Construction Laborers Vacation Trust, 463 U.S. 1, 8 (1983) (footnote omitted); Merrell Dow Pharmaceuticals Inc. v. Thompson, 478 U.S. 804, 810 (1986). The Federal Circuit's interpretation in Aerojet-General directed all appeals that raised either a nonfrivolous patent law claim or counterclaim to the Federal Circuit for review. Aerojet-General Corp. v. Machine Tool Works, Oerlikon-Buejrle Ltd., 895 F.2d 736, 741-44 (Fed. Cir. 1990). The Aerojet-General decision effectively funneled almost all appeals involving a patent issue to the Federal Circuit. As a result, there has been very little development of patent law in the regional circuits and the challenging interpretations of the breadth of the Federal Circuit's jurisdiction under Christianson lay dormant for over 15 years. With this Court's declaration that appellate jurisdiction is

determined only on the basis of the complaint, the welter of jurisdictional issues is again unmasked, and compels immediate attention. See Holmes Gr. 535 U.S. at 830.

Petitioners draw this Court's attention to the conflicting interpretations of when prayed for declaratory relief "arises under" the patent law. Conflict also exists among the Circuits as to whether determining ownership of inventions requires construing the description, and whether ownership of a patent application can be adjudicated without answering inventorship questions.

A. The Circuits are in conflict when applying the directive in Christianson v. Colt that jurisdiction over an appeal is determined by whether the plaintiff's right to relief necessarily depends on a substantial question of federal patent law.

Only the United States Court of Appeals for the Federal Circuit has jurisdiction over the appeal from the District Court because DuPont's right to declaratory relief in its well-pleaded claims necessarily depends on resolution of a substantial question of patent law. The Federal Circuit has exclusive jurisdiction over an appeal from a final decision of a district court if the jurisdiction of that court was based, in whole or in part, on 28 U.S.C. § 1338(a). 28 U.S.C. § 2201; 28 U.S.C. § 1295(a)(1). A civil action arises under the federal patent laws when a well-pleaded complaint establishes either that federal patent law creates the cause of action or that the plaintiff's right to relief necessarily depends on resolution of a substantial question of patent law. Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 809 (1988). Because DuPont's right to relief did so depend, the Sixth Circuit erred in asserting jurisdiction.

When a complaint seeks a declaratory judgment, the breadth of federal court jurisdiction is directly influenced by the coercive relief sought by the plaintiff. In a declaratory judgment action, the plaintiff's relief will necessarily take some "right, title, or interest" from the defendant, and if the defendant will lose some right, title, or interest under patent law, then exclusive jurisdiction in federal court is proper. See Christianson, 486 U.S. at 809. A declaratory judgment action therefore casts a broader net of federal question jurisdiction. "Federal courts have regularly taken original jurisdiction over declaratory judgment suits in which, if the declaratory judgment defendant brought a coercive action to enforce its rights, that suit would necessarily present a federal question." Franchise Tax Board v. Construction Laborers Vacation Trust, 463 U.S. 1, 19 (1983). Therefore, when considering the rule in Holmes Gr. that only claims and not counterclaims must raise a substantial question of patent law sufficient to invoke Federal Circuit jurisdiction, a question unanswered by this Court is whether a declaratory judgment defendant who will lose some interest under patent law has the benefit of exclusive federal jurisdiction. See 535 U.S. at 829, n.1; see also 535 U.S. at 839-40 (Ginsburg dissent); Golan v. Pingel, 310 F.3d 1360, 1367 (Fed. Cir. 2002) (exercising jurisdiction based on the coercive action contemplated by the declaratory defendant).

The entire controversy between Dr. Okuley and DuPont, now stretching over more than 10 years, revolves around the inventorship and ownership of patents and patent applications. DuPont's complaint states that its action is one for "declaratory and other relief to determine conflicting claims of ownership and for a declaration that Okuley has no rights or interest in the invention[s]." Complaint at ¶ 1-2, App. D at 76a. To grant this relief, determination of Dr. Okuley's status as an inventor on the continuation-in-part patent

applications is a necessary element of the well-pleaded claims. DuPont also seeks an order for Okuley to execute certain documents needed for prosecuting continuation-in-part patent applications (including sworn declaration of inventorship). Id. at ¶ 24, at App. D at 82a. Dr. Okuley filed compulsory counterclaims seeking a declaration that he invented the subject matter and thus owned the discoveries.[2] Thus, on these facts, DuPont's claims and Okuley's compulsory counterclaims are inseparable. It is impossible to grant DuPont relief without directly affecting Okuley's rights to the patent applications. DuPont cannot be granted the declaratory relief it seeks, extinguishing Okuley's complete interest, without first answering a question of patent law. As a consequence, the plaintiff's right to declaratory relief at the district court depended in part on a substantial question of federal patent law, and appellate jurisdiction was proper only in the Federal Circuit. Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 809 (1988); Franchise Tax Board v. Laborers Vacation Trust, 463 U.S. 1, 26 (1983); Holmes Gr., Inc. v. Vornado Air Circ. Sys., Inc., 535 U.S. 826, 829-30 (2002); 28 U.S.C. § 1338(a).

Because relief could *only* be awarded on the basis of patent law, the claims "arise under" federal law. When there are no alternative grounds for relief resting solely on state law, assertion of federal jurisdiction is proper. Christianson, 486 U.S. at 810. DuPont did raise contract claims in its complaint. Nonetheless, to succeed in its claim to title to the continuation-in-part applications, DuPont needs to either prove that Dr. Okuley was not an inventor of the newly

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[2] The Defendant's answer sought a declaration that "Okuley is the sole inventor, and hence owner, of the invention..." See Answer at ¶19, at App. E at 99a.

disclosed subject matter, or prove that he was an inventor and was obligated to transfer ownership. Therefore, all the claims rest on resolution of a substantial issue of patent law, and the Sixth Circuit's assertion of jurisdiction conflicts with the decisions of the United States Supreme Court.

Disputes demonstrating similar fact patterns are not uncommon, and the courts have been inconsistent in delimiting federal court jurisdiction under patent law. See, e.g., Regents, Univ. N. Mex. v. Knight, 321 F.3d 1111, 1122 (Fed. Cir. 2003), cert. denied, ___ US___, 124 S. Ct. 104 (2003) (jurisdiction to declare ownership after construing application); Univ. of W. Va. v. Van Voorhies, 278 F.3d 1288, 1295 (Fed. Cir. 2002); Chou v. Univ. of Chicago, 254 F.3d 1347, 1350(2001); Airport Surface Technologies, LLC v. FieldTurf, 268 F.Supp.2d 999, 1003 (N.D. Ill. 2003) (no subject matter jurisdiction to determine inventorship of pending application); In re Tamoxifen Citrate Antitrust Litigation, 222 F.Supp.2d 326, 331 (E.D. N.Y. 2002) (denying remand, "Undeniably, this case presents a difficult issue of federal question jurisdiction under the second prong of Christianson.")

Thus, resolution of this issue is of general importance to the federal courts. In this case, whether the plaintiff's right to relief rests on a question of patent law is dispositive of jurisdiction. The Court is presented with a straightforward opportunity to address this important issue. In light of the frequency at which such disputes occur, this Court's guidance is needed to delimit the breadth of Federal Circuit jurisdiction.

B. It is necessary to construe, based on patent law, the new subject matter described in the continuation-in-part patent applications prior to determining ownership.

The Sixth Circuit decision conflicts with both this Court's and the Federal Circuit's precedent by failing to construe subject matter of the description and the contribution of the inventor before determining ownership of the patent. The power of Congress to grant exclusive rights incident to its constitutional power "To promote the Progress of Science and useful Arts" is expressly limited by the patent clause of the Constitution to "inventors." U.S. Const. art. I, § 8, cl. 8. The "basic *quid pro quo* contemplated by the Constitution" is that an inventor is granted a limited monopoly in exchange for a discovery that "adds to the sum of useful knowledge." Brenner v. Manson, 383 U.S. 519, 534 (1966); Graham v. John Deere Co., 383 U.S. 1, 6 (1966). By failing to first construe the character of the thing invented, the Sixth Circuit has established a precedent which allows declaration of patent ownership that is not first founded on the true inventor. 35 U.S.C. §102(f); See Markman v. Westview, 517 U.S. 370, 384 (1996); cf. Opinion, App. B at 8a-9a.

Only the Federal Circuit has jurisdiction over this appeal, because DuPont seeks as relief full ownership of the continuation-in-part applications, and the relief relies on answering a federal patent law question of who invented the disputed new subject matter. Univ. of W. Va. v. Van Voorhies, 278 F.3d 1288, 1295 (Fed. Cir. 2002); See Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 808-09 (1988); 28 U.S.C §1295(a)(1). A continuation-in-part application contains subject matter disclosed in a prior pending application, "but it adds new subject matter not disclosed in the prior application." Van Voorhies, 278 F.3d

at 1297. (emphasis added) Thus, continuation-in-part applications disclose new subject matter that is "necessarily different from the original subject matter." Id.

Analysis of the ownership of the subject matter of continuation-in-part applications must begin by "determining who actually invented the subject matter claimed" in the application for patent. Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237, 1248 (Fed. Cir. 1993). Inventorship is a matter of patent law. Ethicon, Inc. v. U.S. Surgical Corp., 135 F.3d 1456, 1460 (Fed. Cir. 1998) cert. denied, 525 U.S. 923 (1998). The selection of the inventors, and thus the identity of the initial owners, depends on what is claimed. Burroughs Wellcome Co. v. Barr Labs. Inc., 40 F.3d 1223, 1227-29 (Fed. Cir. 1994), cert. denied, 516 U.S. 1070 (1996). To grant DuPont's claim for relief, and resolve the question of whether Dr. Okuley made new inventive contributions to the continuation-in-part applications it is first necessary to "construe the letters-patent, and the description of the invention." See Markman v. Westview, 517 U.S. 370, 384 (1996) citing Winans v. Denmead, 56 U.S. 330,338 (1854). Implicit in DuPont's prayer for relief is a necessary finding under patent law that Dr. Okuley has not made new inventive contributions to the continuation-in-part applications that are at issue.[3] DuPont's well-pleaded complaint thus also implicitly raises these substantial issues of federal patent law. Only after resolution of the questions of patent law can

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[3] Of the four applications that have been disputed, three applications are derived from the continuation-in-part applications with an identical new disclosure by Okuley. For the purposes of this Court's review the construction of the scope of the new disclosures contributed by Okuley is identical for these three applications and the issued '965 patent.

DuPont assert any contractual rights or interests. See e.g., Van Voorhies, 278 F.3d at 1296-97.

In this dispute, a central and substantial question of federal patent law is whether the 1043D continuation-in-part application (which matured into the '965 patent) discloses new subject matter invented by Dr. Okuley.[4] See Van Voorhies, 278 F.3d at 1296-97.[5] Even though it is no longer disputed that Okuley made additional contributions to the continuation-in-part applications, DuPont continues to steadfastly contest the existence of new inventive contributions by Dr. Okuley. See Complaint at ¶ 17, ¶ 19, App. D at 80a, 81a; R.56 Aff. of Christenbury at 2-4. Cf. Opinion, App. B at 16a.[6] If Okuley made no additional

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[4] Excerpts of U.S. Pat. No. 6,372,965 ('965 patent) are found at App. F at 101a-125a. There are 13 claims in the issued patent. Id. at 123a-125a. Claims 4, 5, 6 and 12 were not enabled by the 1043 parent application, but are directly enabled by the subject matter contributed by Dr. Okuley to the continuation-in-part applications. Id., col. 16, l.40 - col. 17, l. 50 , at App. F at 118a-122a. Claims 4, 5, 6 and 12 are directed to new inventions using the isolated gene to genetically engineer plants. Claims 1, 2, 3, 7, 8, 9, 11, and 13 are directed to several iterations of an "isolated nucleic acid fragment," i.e. variations of the FAD2 gene. Id. at 123a-125a.

[5] The Federal Circuit explicitly stated: "while questions of contract law are matters of state law, the issue here depends on the fact question of whether the '340 application was a CIP of the '970 application. That is a question of patent law, which we interpret according to federal law." Van Voorhies, 278 F.3d at 1296-97.

[6] The Sixth Circuit erred in assuming that there is only a single invention disclosed by the several patent applications, when it failed to construe the scope of the several inventions. (making a

inventive contribution to the continuation-in-part applications, then there would be no federal question as DuPont's claim would swing on the enforceability of Okuley's original assignment. Because Okuley did make an additional contribution, DuPont's claims to ownership of Okuley's disclosure in the continuation-in-part applications must arise initially through his status as an inventor. To grant relief, it is necessary to construe the scope of the inventions and their true inventor, both questions of federal patent law. Markman v. Westview, 517 U.S. 370, 384 (1996); Univ. of W. Va. v. Van Voorhies, 278 F.3d 1288, 1297 (Fed. Cir. 2002). The Sixth Circuit failed to construe the new matter disclosed in the specification and its ownership determination thus directly conflicts with Federal Circuit authority.

C. The Sixth Circuit decision conflicts with Federal Circuit precedent that inventorship is a necessary element of a claim of ownership.

There is a direct conflict between Federal Circuit precedents and the Sixth Circuit decision whether determination of inventorship is a necessary element of a claim to ownership. Since the 1982 establishment of the Court of Appeals for the Federal Circuit, there has been little development of patent law among the regional circuits. Thus, when a Sixth Circuit decision conflicts with the law in the Federal Circuit, it, in essence, conflicts with the law as followed in the other regional circuits. Resolution of this conflict by this Court will engender efficiency in the

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determination that "this transformation work was merely used to confirm the identity and use of FAD2 covered under the original patent application"). Opinion at App. B at 9a n.2, 16a.

administration of patent law, and avoid the waste of judicial resources by needless litigation over the proper process of resolving patent ownership disputes.

Inventorship is one of the most complex issues in patent law. See e.g., Mueller Brass v. Reading Indus., 353 F. Supp. 1357, 1372 (E.D. Pa. 1972). Thus, where an ownership dispute springs from a question of inventorship, the claim "arises under" patent law, and the Federal Circuit is the proper forum for appeal. While not all disputes over ownership of a patent arise under the patent laws, where the core of the controversy revolves around the prospective contributions of a putative first inventor, the controversy cannot be resolved without addressing inventorship. When seeking to obtain ownership from the first inventor, determination of actual inventorship is a necessary element of a patent ownership claim. "At the heart of any ownership analysis lies the question of who first invented the subject matter at issue." Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237 (Fed. Cir. 1993). Absent some effective transfer or other obligation to assign patent rights, the individual inventor owns the right to apply for and obtain a patent. University Patents, Inc. v. Kligman, 762 F.Supp. 1212, 1218-19 (E.D. Pa. 1991). Thus, under Federal Circuit law, only after defining inventorship, can it be determined whether there has been a valid transfer of an inventor's rights to another party. When resolution of competing ownership interests necessarily depends on resolution of a substantial question of federal patent law, patent law is a necessary element of one of the well-pleaded claims. Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 809 (1988).

Without first construing the character of the subject matter invented and finding that it was invented by Dr. Okuley, there can be no assurance that an actual controversy exists. The

courts have no jurisdiction over disputes without live controversies, and have no power to render a decision. Christianson, 486 U.S. at 818. "A party seeking a declaratory judgment has the burden of establishing the existence of an actual case or controversy." Cardinal Chem. Co. v. Morton Int'l, Inc., 508 U.S. 83, 95 (1993). If Okuley were not an inventor of the new matter in the continuation-in-part applications, then there would be no controversy and the district court would be without jurisdiction over the continuation-in-part applications. A district court ruling without jurisdiction over the subject matter would be an unconstitutional advisory opinion. DuPont can only own the patent by acquiring it through a true inventor. Okuley retains ownership of any part of the disclosed matter he invented that he is not otherwise obligated to assign. Therefore, a necessary first element in establishing a claim to ownership through Dr. Okuley is legal a determination that Dr. Okuley is an inventor of the subject matter in controversy. Inventorship is a question of law, and the parties cannot stipulate to inventorship. Ethicon v. U.S. Surgical Corp., 135 F.3d 1456 (Fed. Cir. 1998), cert. denied __ U.S. __, 199 S. Ct. 278 (1998); Sewall v. Walters, 21 F.3d 411, 415 (Fed. Cir. 1994), reh'g denied (1994). James B. Clow &-Sons, Inc. v. U.S. Pipe & Foundry Co., 313 F.2d 46, 51 (5th Cir. 1963). Even if the parties had stipulated that that Dr. Okuley is at least a joint inventor, the patent law issue of who invented the new disclosures in the continuation-in-part applications remains. Especially in patent cases, where identification of the true inventor can be particularly troublesome, failure to ascertain inventorship risks the correct parties not being before the court. Because the district court had to assert jurisdiction in part under §1338 to make a determination of inventorship, the Federal Circuit has exclusive jurisdiction over Okuley's appeal of the final

order. Christianson, 486 U.S. at 808-09; 28 U.S.C. §1295(a)(1).

The Federal Circuit found patent law jurisdiction in a suit for determination of co-inventorship and co-ownership. MCV, Inc. v. King-Seeley Thermos Co., 870 F.2d 1568, 1571 (Fed. Cir. 1989). The Federal Circuit stated that the federal patent laws were a necessary element of the plaintiff's complaint, as the plaintiff's co-ownership arises from and depends solely on the patent law issue of inventorship. Federal Circuit precedent consistently holds that ownership follows directly from inventorship. There is little question that this precedent compels defining inventorship as a first step towards determining ownership.[7] The Sixth Circuit discounted MCV

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[7] See, e.g., Ethicon v. U.S. Surgical Corp.,135 F.3d 1456, 1460, 1465 (Fed. Cir. 1998), cert. denied, 525 U.S. 923 (1998). ("a co-inventor need not make a contribution to every claim of a patent. A contribution to one claim is enough. Thus, the critical question for joint conception is who conceived, as that term is used in the patent law, the subject matter of the claims at issue. In the context of joint inventorship, each co-inventor presumptively owns a pro rata undivided interest in the entire patent, no matter what their respective contributions.") (citations omitted); Teets v. Chromalloy Gas Turbine Corp., 83 F.3d 403, 407 (Fed. Cir. 1996), cert. denied, 519 U.S. 1009 (1998) ("Ownership springs from invention. The patent laws rewards individuals for contributing to the progress of science and the useful arts. As part of that reward, an invention presumptively belongs to its creator. This simple proposition becomes more complex when one creates while employed by another person.") (citations omitted); Arachnid, Inc. v. Merit Industries, Inc., 939 F.2d 1574, 1581 (Fed. Cir. 1991) ("Although an agreement to assign in the future inventions not yet developed may vest the promisee with *equitable* rights in those inventions once made, such an agreement does not by itself vest *legal* title to patents on the inventions in the promisee: The

and all its progeny and instead relied on a district court decision from a distant forum. App. B at 7a-8a; citing RustEvader v. Cowatch, 842 F.Supp. 171 (W.D. Pa. 1993). The Sixth Circuit distinguished MCV as being a case involving correction of inventorship under 35 U.S.C. § 256. While MCV did involve correction of inventorship of an issued patent, the Federal Circuit found both that MCV's cause of action was created by federal patent law and that the relief sought necessarily depended on resolving a substantial question of federal patent law, stating "MCV's co-ownership arises from and depends solely on the patent law issue of inventorship." MCV, Inc. v. King-Seeley Thermos, Co., 870 F.2d 1568, 1571 (Fed. Cir. 1989).

The public's reliance on a patent listing the true inventors is damaged when contested inventorship remains unresolved. This Court can thus offer valuable guidance to the lower courts by emphasizing the primacy of inventorship. Nonetheless, it is clear that Federal Circuit precedent places determination of inventorship as the first step in determining ownership, and the Sixth circuit's decision is contrary to that precedent. This Court should grant review to resolve this

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legal title to an invention can pass to another only by a conveyance which operates upon the thing invented after it has become capable of being made the subject of an application for a patent.) (emphasis in original); University Patents, Inc. v. Kligman, 762 F. Supp. 1212, 1218-19 (D. Pa., 1991) ("Although 'ownership' and 'inventorship' are not identical for patent law purposes, they are related. Inventorship provides the starting point for determining ownership of patent rights. The true and original inventor must be named in the application for a patent and, absent some effective transfer or obligation to assign the patent rights, the original inventor owns the right to obtain the patent.").

conflict among the circuits and provide inventors and patent owners the benefits of settled law.

II. Uniform application of patent law is vital for technology development and the economic success of the United States.

With the development of a global economy, the value of patents and the technological advances they protect has become an increasingly important asset to the economic health of the United States. Reducing concerns over the uncertainty of appellate jurisdiction and the attendant inconsistency in application of patent law by the regional circuits will reassure those in a position to invest in research and development. This Court's review would be a valuable contribution towards defining the outer limits of patent jurisdiction of the federal courts.

A. The value of the Federal Circuit in maintaining the security of U.S. patent law is endangered by erosion of uniformity.

The Federal Circuit was created by Congress to eliminate the costly and damaging impact of widely varying results in patent infringement cases arises from conflicts among the circuit court that would ultimately hear an appeal. During the gestation of the legislation creating the Federal Circuit, Senator Dole remarked that "a more predictable and more uniform judicial environment [was needed] to enable inventors, investors, and businesses to feel secure with the exclusive property rights they supposedly obtain with a patent." See Remarks to 9th Judicial Conf. of the C.C.A.P. 94 F.R.D. 347, 355 (1982). Since that time, the value of patents has become an increasingly valuable part of this country's economy, with the licensing of patents worth

hundreds of billions of dollars annually. See K. W. Dam, The Economic Underpinnings of the Patent Law, 23 J. Legal Stud. 247, 261 (1994). While the congressional intent of the legislation alone cannot be used to "determine what the words of the statute must fairly be understood to mean," the countervailing interest of promoting uniformity of the patent law can inform this Court's delineation of which cases raise a "substantial question of federal patent law." Holmes Gr., Inc. v. Vornado Air Circ. Sys., Inc., 535 U.S. 826, at 833, (2002); 535 U.S. at 838-39 (Stevens concurrence); Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 809 (1988). This Court should take action to set the balance between the promotion of uniformity of patent law and those occasional cases that "provide an antidote to the risk that specialized courts may develop an institutional bias. Holmes Gr., 535 U.S. at 839 n.3 (Stevens concurrence).

Immediately following this Court's decision in Holmes Gr. there was substantial commentary decrying the potential for disruption of the uniformity of patent law developed through the Federal Circuit. See, e.g., J.M. Mueller, "Interpretive Necromancy" or Prudent Patent Policy? The Supreme Court's "Arising Under" Blunder in Holmes Group v. Vornado 2 J. Marshall Rev. Intell. Prop. L. 57 (2002); C.A. Cotropia, "Arising Under" Jurisdiction and Uniformity in Patent Law, 9 Mich.Telecomm. Tech.L. Rev. 253 (2003). Certain commentators called for congressional action to amend the statute so that nonfrivolous counterclaims would be directed to the Federal Circuit. See generally E.I. Rogers, The Phoenix Precedents: The Unexpected Rebirth of Regional Circuit Jurisdiction over Patent Appeals and the Need for a Considered Response, 16 Harv. J. Law & Tec. 411 (2003); M. Mosely-Goren Jurisdictional Gerrymandering? Responding to Holmes Group v. Vornado Air Circ. Sys., 36 J. Marshall L.Rev. 1 (2002). To date, no legislation has been

seriously considered to reach that end, so it appears that the courts themselves will now be routinely called upon to draw the line among claims that arguably raise a question of patent law. Differences that develop between the patent law in the different regional circuits threatens a return to a situation where the "diversity in the application of patent laws reduced the value of patents." A.M. Maher, The Holmes Decision, Nat'l. L.J., July 8, 2002, at 1. Rather than wait for disruptive conflicts between the circuits to develop, this Court should take up this case to clarify the directives of Christianson and Franchise Tax Board.

The courts have long struggled with the issue of whether a claim arises under federal law. The regional circuits therefore rely on the guidance of this Court for determining when a plaintiff's claims "arise under" patent law, thus directing appeals to the Federal Circuit. As Justice Cardozo stated"[w]hat is needed is something of that common-sense accommodation of judgment to kaleidoscopic situations...a selective process which picks the substantial causes out of the web and lays the other ones aside." Gully v. First National Bank, 299 U.S. 109, 117-18 (1936) quoted by Franchise Tax Board v. Construction Laborers Vacation Trust, 463 U.S. 1, 20-21 (1983). This Court's guidance is needed to direct the course of appeals involving patent claims so that the reliability of patent law developed since the creation of the Federal Circuit is not unnecessarily impeded.

Appellate courts are now called upon to entertain unsettled jurisdictional questions centered on determining whether a complaint states a claim arising under the patent laws, and therefore is the sole province of the Federal Circuit. There are significant practical consequences for the enforcement of patent rights springing from Holmes Gr.. If the "arising under" directive of Christianson is given an unnecessarily

narrow reading by the circuits, then many appeals of cases which have at their core a patent claim that is directly voiced only in counterclaims will be directed to the regional circuits. The result would be a return to the kaleidoscopic interpretation of patent laws that was present before the creation of the Federal Circuit.

B. The uniform enforcement of patent law is endangered by a narrow interpretation of the "arising under" patent law jurisdiction of the Federal Circuit.

Expensive jurisdictional battles arising from the race to the courthouse preceded any effort to get at the merits in many if not most important cases prior to the creation of the Federal Circuit. It is against the best interest of inventors, patent holders, and the citizens of the United States to have a reinvigoration of the rampant forum shopping that was formerly present. See Holmes Gr., 535 U.S. at 840 (Ginsburg dissent). The uniformity of patent law which was Congress' express goal for creation of the Federal Circuit is threatened.[8]

The Sixth Circuit should have decided to defer to Federal Circuit precedent on patent claims, unless there existed direct conflict with its own precedents or there existed some other compelling reason to make radically new law. See Christianson v. Colt, 822 F.2d 1544, 1552 n.10 (Fed. Cir. 1987) (rev'd on other grounds) ("The regional circuits might

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[8] For a discussion of rampant forum shopping present before the creation of the Federal Circuit, see R. Dreyfuss, The Federal Circuit: A Case Study in Specialized Courts, 64 N.Y.U.L. Rev. 1, 30-37 (1989).

elect to apply the patent precedents in such cases, just as this court applies regional circuit precedents in [other] areas of law..."). If the Sixth Circuit (or other Circuit applying the same rationale) is seen as favorable to certain classes of patent owners, then those courts could become a preferred jurisdiction for suits involving ownership disputes. Instead by choosing to avoid full determination of inventorship, the Sixth Circuit risks the inevitable case will arise where a non-inventor claiming an interest is party to the suit; the court in that instance would issue a wholly advisory and unconstitutional opinion determining ownership apart from inventorship.

The regional circuits will be free to disagree with the Federal Circuit on any issue that has not been settled by Supreme Court precedent. Even though the expectation is that regional circuits will apply Federal Circuit law as persuasive authority, there is nothing that requires them to do so. The effect of the Sixth Circuit's decision has an impact far beyond the issues of this case. Artful drafting of claims could lead to patent related cases being tried in state court, or if brought in the district court on diversity grounds, appealed to the Sixth Circuit. The effect will slowly but surely undermine the uniform application of patent law fostered by the creation of the Federal Circuit and lead to "the accretion of non-Federal circuit precedent" which "over time will be a return to the state of patent law to its pre-Federal Circuit morass." Mosely-Goren, supra, 36 J. Marshall L.Rev. 1, 49 (2002). See, J. M. O'Malley and B. M. Wexler, Forum Shopping More likely as a Result of Narrowing of Federal Circuit Jurisdiction in Vornado, Intell. Prop. Today, Mar. 2003, 39-41.

This Court's attention to delimiting the breadth of Federal Circuit jurisdiction and resolving the conflicts that do occur

will of great value to all those that rely on a uniform patent law.

III. The Sixth Circuit erred by asserting jurisdiction over this appeal and by failing to construe inventorship.

The Sixth Circuit did not have jurisdiction to hear this case because the jurisdiction of the district court was based, in whole or in part, on patent law. 28 U.S.C. § 1295(a)(1), §1338(a). The Sixth Circuit also erred when it failed to define inventorship before determining ownership.

Because the relief DuPont sought and was granted required construing the scope of several continuation-in-part patent applications, determining the inventors of the individual claims, and determining who owns the inventions subject to contractual assignment, the relief depended on a question of patent law. Declaration of ownership in the continuation-in-part patent applications depends on the patent law question of the scope of subject matter of the applications. The Court's failure to define the subject matter of the continuation-in-part patent applications, erroneously avoided invoking federal patent law questions. There is no indication that the panel ever construed the scope of the description or inventorship of the continuation-in-part applications. This error prevented the Court from properly construing the underlying contracts between Okuley and WSU and between WSU and DuPont that could have imposed obligations on Okuley to assign subsequent inventions to DuPont.[9] Nor did

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[9] The scope of the Research Collaboration Agreement (RCA) between DuPont and WSU professor John Browse is limited to "[y]our work under this agreement shall be to collaborate in

the court cite the conflicting authority which found appellate jurisdiction in the Federal Circuit. Univ. of W. Va. v. Van Voorhies, 278 F.3d 1288, 1295 (Fed. Cir. 2002); Golan v. Pingel, 310 F.3d 1360, 1367 (Fed. Cir. 2002); Chou v. Univ. of Chicago, 254 F.3d 1347, 1358 (Fed. Cir. 2001). Therefore, the Sixth Circuit erred, and review is of exceptional importance.

The panel's failure to construe the scope of the new subject matter contributed by Okuley to the continuation-in-part applications avoids essential determinations of patent law necessary for establishing DuPont's right to ownership to the continuation-in-part applications. Neither Dr. Okuley's ownership interest as an inventor in the new subject matter of the continuation-in-part patent applications, nor his or WSU's obligation to transfer that ownership interest can be determined without defining the metes and bounds of the property interest in relation to the RCA and the WSU Faculty Manual. Failing to accurately construe the subject matter of the inventions prevented the Court from properly applying to the facts their legal interpretation of the RCA and the Faculty Manual. Before a court can determine who owns the new subject matter of the continuation-in-part applications under contract, that court must first legally construe the subject matter.

When a federal court dispenses with defining inventorship, it only postpones a decision and wastes judicial resources by forcing another court to later resolve the issue. With an issued patent, a claim for inventorship is likely to later arise either through another action by the inventor or as part of an

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screening, identifying and cloning genes that affect seed lipid composition..." See Order, App. C at 19a-22a.

infringement action. By declining to exercise jurisdiction over inventorship, the Sixth Circuit effectively prevented a resolution of inventorship on the '965 patent. As a result, both the public and Dr. Okuley will be denied the "interest of assuring correct inventorship designations on patents." Chou v. Univ. of Chicago, 254 F.3d 1347, 1358 (Fed. Cir. 2001). Barring Dr. Okuley's counterclaim for a judicial determination of inventorship both ignores the Federal Circuit's specific rebuke of the District Court Order and on its face conflicts with Federal Circuit precedent. Chou, 254 F.3d at 1358 (stating in reference to DuPont v. Okuley, "An Ohio district court has taken a similar position. We are not bound by the decisions of the district courts and respectfully, we do not agree with them."). The Sixth Circuit's opinion fails to acknowledge the right of attribution recognized by Chou, and the right of the public to the sanctity of inventorship on the patents granted by the United States.

The dangers of allowing inventorship to remain undefined are highlighted in this case. Though it declined to determine inventorship as a matter of patent law, the district court ordered Dr. Okuley to "execute whatever documents are necessary in order that DuPont may prosecute the Continuation-in-Part applications." Order, App. C at 73a. This directive, in effect, abdicated the court's power and allowed DuPont to declare inventors unilaterally.[10] DuPont

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[10] The declaration submitted for Dr. Okuley's signature by DuPont states "all statements made herein of my/own knowledge are true, all statements made herein on information and belief are believed to be true, and further these statements were made with the knowledge that willful false statements and the like are punishable by fine and imprisonment." See 35 U.S.C. § 115. The Order acknowledges that Dr. Okuley does not believe that the

almost immediately acted to change the listed inventors yet another time.[11] Yet, Dr. Okuley, on information and belief, cannot execute the papers naming five other inventors. Such an incongruous result would have been avoided had the District Court defined inventorship before ordering Dr. Okuley to execute the papers DuPont seeks as part of their relief.

The Sixth Circuit threatens to reinvigorate past abuses of forum shopping by creating a less rigorous process for determining patent ownership while avoiding thorny issues of inventorship. The Sixth Circuit opinion establishes new law, a new test for determining patent ownership. This new test is that a "court need concern itself only with the relative rights" of the [named] parties and where a putative inventor has "contractually assigned all his interest," a determination of ownership would not require "answering the inventorship question." App. B at 8a-9a. A plaintiff disputing ownership with underlying inventorship issues would need only to artfully craft the complaint to include only contract claims, avoiding any prayer for relief sounding in patent, and the less rigorous Sixth Circuit test would apply. See Holmes Gr., Inc. v. Vornado Air Circ. Sys., Inc., 535 U.S. 826, 831 (2002). Thus, inventorship would remain unresolved, to be

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inventorship eventually listed on the '965 patent is correct. Order, App. C at 40a-41a.

[11] DuPont attorneys have identified at least four different entities as the inventors on the FAD2 patent applications, including Nov. 1992, Lightner and Yadav; February 1993, Lightner; May 1993, Okuley and Lightner; April 1999 Okuley, Lightner, Hitz, Kinney, Perez-Grau, and Yadav. R.53 at Ex.3 at 45-46, 55-58; R.53 at Ex. U; R.56, Aff. of Christenbury; U.S. Pat. No. 6,372,965; App. F. at 101a.

determined another day, by another court. Cardinal Chem. Co. v. Morton Int'l, Inc., 508 U.S. 83, 100 (1993). There is no assurance that courts of different circuits or different states would not reach inconsistent decisions.

The Federal Circuit was established to provide a uniform body of patent law, generally applicable to all cases. The Sixth Circuit declined to follow the weight of Federal Circuit precedent to first determine inventorship, when ownership springs directly from the inventor. To foster uniformity of the nation's patent laws, the express purpose for creating the Federal Circuit, this Court should grant review and reverse the judgment of the Sixth Circuit.

CONCLUSION

For the foregoing reasons, the questions of proper appellate jurisdiction of the Federal Circuit and the uniform application of patent law are of the utmost importance. Therefore, Dr. Okuley requests the Court grant the petition and reverse the judgment of the United States Court of Appeals for the Sixth Circuit.

Respectfully submitted,

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APPENDIX A

UNITED STATES COURT OF APPEALS FOR THE SIXTH CIRCUIT

Case No. 01-3074

[Filed Nov. 21, 2003]

E. I. DU PONT DE NEMOURS & COMPANY,
Plaintiff-Appellee,

v.

DR. JOHN JOSEPH OKULEY,
Defendant-Appellant.

BEFORE: BOGGS, Chief Judge; COLE, Circuit Judge; and BELL,* District Judge.

AMENDED ORDER

The court having received a petition for rehearing en banc, and the petition having been circulated not only to the original panel members but also to all other active** judges of

* Hon. Robert Holmes Bell, Chief United States District Judge for the Western District of Michigan, sitting by designation.

** Judge Moore recused herself from participation in this ruling.

this court, and no judge of this court having requested a vote on the suggestion for rehearing en banc, the petition for rehearing has been referred to the original panel.

The panel has further reviewed the petition for rehearing and concludes that the issues raised in the petition were fully considered upon the original submission and decision of the case. Accordingly, the petition is denied.

APPENDIX B

UNITED STATES COURT OF APPEALS FOR THE SIXTH CIRCUIT

Case No. 01-3074

[Filed Sept. 17, 2003]

E.I. Du Pont de Nemours & Company, Plaintiff-Appellee,

v.

Dr. John Joseph Okuley, Defendant-Appellant.

Appeal from the United States District Court for the Southern District of Ohio at Columbus.

Before: BOGGS and COLE, Circuit Judges; and BELL, Chief District Judge.*

OPINION

* The Honorable Robert Holmes Bell, Chief United States District Judge for the Western District of Michigan, sitting by designation.

BOGGS, Circuit Judge.

The defendant, Dr. John Joseph Okuley, appeals the summary judgment for the plaintiff, E.I. Du Pont de Nemours and Company ("DuPont"), in a dispute involving both contract and patent elements. Okuley helped discover FAD2, one of the genes encoding the Fatty Acid Desaturase enzyme, while an employee of Washington State University ("WSU"), which had a research collaboration agreement ("RCA") with DuPont that assigned to DuPont rights to intellectual property discovered in the course of the collaboration. When Okuley ceased cooperating with the processing of DuPont's application for a patent on FAD2, DuPont filed suit in the United State District Court for the Southern District of Ohio for a declaratory judgment that it owned FAD2 and for specific enforcement of Okuley's agreement to cooperate with DuPont. Okuley counterclaimed for a declaratory judgment that he was the inventor of FAD2 and to rescind his personal assignment of patent rights to DuPont. The district court granted summary judgment to DuPont on all issues. After initially appealing the district court's decision to this court, Okuley moved to transfer the appeal to the Court of Appeals for the Federal Circuit. We take appellate jurisdiction of this matter and affirm the judgment of the district court.

I

In 1991, Okuley, a Ph.D. in molecular biology, began work at WSU on a project on plant fat metabolism, with the aim of isolating and patenting genes that could increase the ratio between beneficial fatty acids and harmful saturated fats. Under the WSU Faculty Manual ("Faculty Manual"), employees assigned to WSU any intellectual property arising out of their employment, and WSU and DuPont were operating under the RCA regarding the assignment of the

intellectual property arising out of this project. In August 1992, while still employed at WSU, but while working at a borrowed laboratory at Ohio State University ("OSU"), Okuley successfully identified the FAD2 gene and immediately informed both his supervisor at WSU and DuPont of his discovery. On November 17, DuPont initiated the patent process on FAD2. After some initial disagreement about the inventorship of FAD2, the issue was resolved in May 1993 by DuPont agreeing that inventorship was shared between Okuley and another WSU scientist and Okuley agreeing to assign to DuPont his "entire right, title and interest" in FAD2 and obligating himself to "execute all applications, papers or instruments necessary or required" for DuPont to obtain the patent. In December 1994, relations under this agreement between DuPont and Okuley broke down over Okuley's refusal to sign any more of the papers necessary for the patent application, unless he received "a reasonable royalty for the use of this invention." DuPont thereafter filed a petition with the Patent and Trademark Office ("PTO") to process the FAD2 patent application without Okuley's consent. At the time briefs in this case were filed, both the petition and the application were still pending, but on April 16, 2002, the PTO issued the patent litigated here.

On November 3, 1997, DuPont filed a three-count complaint against Okuley in the United States District Court for the Southern District of Ohio. Subject matter jurisdiction was based on diversity, DuPont being a Delaware corporation, with its principal place of business in Delaware, and Okuley a citizen of Ohio, and the matter in controversy meeting the jurisdictional amount. The first count sought a declaratory judgment that DuPont had exclusive ownership of the FAD2 gene, at least *vis-a-vis* Okuley. The second count sought specific enforcement of Okuley's contractual duties to

continue executing documents necessary for DuPont to pursue the FAD2 patent. The third count sought the same relief on the basis of Okuley's common law duties. Okuley counterclaimed, seeking rescission of his personal assignment of FAD2 to DuPont and a judicial declaration that Okuley was the sole owner and inventor of FAD2. On November 1, 2000, after extensive discovery, the parties filed cross-motions for summary judgment on all counts. The district court granted summary judgment to DuPont on all issues. It concluded that it had no jurisdiction to entertain Okuley's claim to inventorship, that DuPont owned the rights to FAD2 under its agreement with WSU, that Okuley was bound by the Faculty Manual to assign all interests in FAD2 to DuPont; and that Okuley's personal, written assignment to DuPont was valid, enforceable, and not subject to rescission. Okuley timely appealed the district court's judgment to this court. After filing his proof brief in this court, Okuley moved to transfer the appeal to the Court of Appeals for the Federal Circuit, on the basis that it had exclusive appellate jurisdiction in this case.

II

We first turn to the issue of proper appellate jurisdiction. This court has jurisdiction over almost all appeals from final decisions of district courts within its geographical boundaries. 28 U.S.C. § 1294. However, the Court of Appeals for the Federal Circuit has exclusive jurisdiction over appeals from final decisions of a district court, if the jurisdiction of that court was based, in whole or in part, on 28 U.S.C. § 1338(a), subject to certain exceptions not applicable here. 28 U.S.C. § 1295. District court jurisdiction under § 1338(a) extends "only to those cases in which a well-pleaded complaint establishes either that federal patent law creates the cause of action or that the plaintiff's right to relief necessarily depends

on resolution of a substantial question of federal patent law, in that patent law is a necessary element of one of the well-pleaded claims." *Christianson v. Colt Indus. Operating Corp.*, 486 U.S. 800, 809, 108 S. Ct. 2166, 100 L. Ed. 2d 811 (1988). The seemingly amorphous "substantial question of federal patent law" component of the test merely makes clear that a plaintiff cannot avoid federal patent jurisdiction by leaving out an element necessary to the success of his claim, any more than a plaintiff can create federal jurisdiction by including extraneous references to federal law. *Ibid.* Moreover, it is important to note that only inventorship, the "question of who actually invented the subject matter claimed in a patent," is a question of federal patent law. *Beech Aircraft Corp. v. Edo Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993). "Ownership, however, is a question of who owns legal title to the subject matter claimed in a patent, patents having the attributes of personal property" and is not a question of federal patent law. *Ibid.*

These principles are illustrated by *Rustevader Corp. v. Cowatch*, 842 F. Supp. 171 (W.D. Pa. 1993). In that case, Rustevader sued its former employee, Cowatch, and Cowatch's father in state court. The defendants had jointly taken out a patent and Rustevader demanded assignment of the patent under a breach of employment contract theory. The defendants removed to federal court on the basis of federal patent jurisdiction and Rustevader asked for remand on the basis that there was no federal jurisdiction. The court reasoned that if the suit had been filed exclusively against the former employee, the court could have ordered an assignment to the employer on the basis of contract, regardless of whether the son was the inventor, and a resolution of the inventorship issue would not have been necessary. However, the plaintiff also made a claim against the father, who was not in contractual privity with the plaintiff. If the father was in

fact, as the patent application claimed, an inventor of the disputed patent, Rustevader had no right to the assignment of his interest. If the son was the sole inventor and the contract assigned his rights to Rustevader, Rustevader had a right to the assignment of both father's and son's interest. Therefore, Rustevader's claim against the father required a resolution of the question of inventorship and unintentionally invoked federal patent jurisdiction.

This court has appellate jurisdiction if, and only if, DuPont's well-pleaded complaint necessarily requires resolution of the question of inventorship. The only claim in DuPont's complaint relevant to this question is the request for a declaratory judgment that DuPont had "sole title to [the FAD2] intellectual property." At first blush, to determine the validity of such a broad claim would appear to require resolution of the inventorship question, but a focus on the issues facing the court leads to the opposite conclusion. First, the district court only had the power to adjudicate the relative rights of the parties. Even if a hypothetical third party X had been the true inventor of the FAD2 gene, no judgment could have affected X's rights, as the district court never took personal jurisdiction over X. Therefore, the court needed concern itself only with the relative rights of DuPont and Okuley, regardless of the language of the complaint. The broad language of the complaint was extraneous to the resolution of the matter between the parties to the case. DuPont could not create federal patent jurisdiction by making the unnecessarily broad claim. Okuley cannot now use the overbreadth of DuPont's complaint to claim federal patent jurisdiction.

Second, as between Okuley and DuPont, the district court could have resolved the relative interests in FAD2 on several theories. For example, it could have determined that one of

DuPont's other researchers was the sole inventor of FAD2 and that Okuley therefore had no right to the intellectual property. That would have required answering the inventorship question. Alternatively, the district court could have reasoned, as in fact it ultimately did, that if Okuley was the inventor of FAD2, he contractually assigned all his interests to DuPont. That would not have required answering the inventorship question. If there are several alternative theories on which a claim may succeed, patent law jurisdiction is only invoked when *all* alternative theories necessarily state a complaint under the patent law. *Christianson*, 486 U.S. at 810.[1] As DuPont's assignment theory sounded in contract, not patent law, DuPont's claim to the sole ownership of the gene did not invoke patent law jurisdiction.[2] Therefore, appellate jurisdiction lies with this court.

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[1] The alternative rule, that federal patent jurisdiction is invoked whenever *any* of the theories on the basis of which a claim may succeed necessarily states a complaint under patent law, would eradicate *Beech Aircraft's* distinction between inventorship actions, arising under the federal patent law, and patent ownership actions, not arising under the federal patent law, as any patent ownership claim could hypothetically succeed on the basis that the claimant was the inventor, rather than the contractual purchaser of the invention. Such an alternative rule would also be contrary to *Christianson*.

[2] It is worth noting that, while of course subject matter jurisdiction is decided on the basis of the well-pleaded complaint and not the well-tried case, over the course of the four-year litigation there appears to have been absolutely no disagreement between the parties that Okuley was an inventor of FAD2. All issues in this case were decided solely on the validity and construction of agreements between the parties and the involved universities.

A separate jurisdictional issue arises with respect to Okuley's counter-claim of sole inventorship, which the district court had dismissed for lack of jurisdiction.[3] In the proceedings below, Okuley had argued that the district court had been granted jurisdiction in two sections of the patent code.

> Whenever through error a person is *named in an application for patent* as the inventor, or through error an inventor is not named in an application, and such error arose without any deceptive intention on his part, the Director *may* permit the application to be amended accordingly, under such terms as he prescribes.

35 U.S.C. § 116 (emphases added).

> Whenever through error a person is named in *an issued patent* as the inventor, or through error an inventor is not named in *an issued patent* and such error arose without any deceptive intention on his part, the Director may, on application of all the parties and assignees, with proof of the facts and such other requirements as may be imposed, issue a certificate

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[3] Okuley's counter-claim does not affect the issue of appellate jurisdiction of the Federal Circuit. Even if he had standing to sue to clarify inventorship, still no federal patent appellate jurisdiction would exist, because Okuley's inventorship claims were *counter-claims*. "[A] counterclaim-which appears as part of the defendant's answer, not as part of the plaintiff's complaint-cannot serve as the basis for 'arising under' jurisdiction." *Holmes Group, Inc. v. Vornado Air Circulation Sys.*, 535 U.S. 826, 831, 122 S. Ct. 1889, 153 L. Ed. 2d 13 (2002). Hence a patent-law counter-claim does not create federal patent jurisdiction under § 1338.

> correcting such error. . . . *The court* before which such matter is called in question may order correction of the patent on notice and hearing of all parties concerned and the Director *shall* issue a certificate accordingly.

35 U.S.C. § 256 (emphases added).

We affirm the holding of the district court on the basis of the language of § 116 and § 256 and their notable differences. At the time of the trial and the briefs, no patent had yet been issued. Therefore, only § 116 applied. Section 116 does not mention courts, but rather gives discretion to the Director of the PTO to permit amendments to patent applications and to do so under such terms as the Director deems proper. Section 256, by contrast, explicitly mentions the courts and the authority of the courts to compel action by the Director. Comparing these two sections, it is clear that Congress intended to draw a distinction between patent applications and issued patents. While the patent is still in the process of gestation, it is solely within the authority of the Director. As soon as the patent actually comes into existence, the federal courts are empowered to correct any error that the Director may have committed. Such a scheme avoids premature litigation and litigation that could become futile if the Director declined to grant a patent or voluntarily acceded to the claims of the would-be inventor prior to issue. We conclude, therefore, that the district court lacked jurisdiction to review the inventorship of an unissued patent.

After the briefs in this case were filed, the PTO issued a patent naming Okuley, among others, as inventor. While this may have created § 256 jurisdiction to review Okuley's inventorship claim, in reviewing the district court's judgment we consider the facts as faced by that court, without prejudice

to a § 256 claim should Okuley choose to file such an action. In this appeal, Okuley has dropped any argument that § 256 was applicable and merely made a perfunctory statement that § 116 vests jurisdiction in the courts implicitly because "inventorship is a question of law." However, federal courts have not been granted jurisdiction to settle all questions of law.

III

Having disposed of the somewhat thorny issues of federal patent jurisdiction, we now turn to the substance of the claims adjudicated by the district court and appealed here. These are questions of property and contract law and, as explained above, do not arise under federal law, patent law or otherwise. The district court's jurisdiction was based on the diversity of the parties. When sitting in diversity, a federal court applies the substantive law of the state. *Erie R. Co. v. Tompkins*, 304 U.S. 64, 78, 58 S. Ct. 817, 82 L. Ed. 1188 (1938). Hence, our source of law with respect to the contracts WSU entered with Okuley and DuPont in Washington is Washington law. With respect to the assignment executed in Ohio and the interpretation of Ohio statutes, the source is Ohio law.

The judgment appealed was a grant of summary judgment, so we apply the well-known summary judgment standard:

> This court reviews grants of summary judgment *de novo*, under the same standard as the district court. Summary judgment is appropriate when the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment

> as a matter of law. In reviewing a summary judgment, this court reviews the factual evidence and draws all reasonable inferences in favor of the non-moving party. To prevail, the non-movant must show sufficient evidence to create a genuine issue of material fact. A mere scintilla of evidence will not suffice for the non-movant to overturn the summary judgment, but instead, the non-movant must show evidence on which the jury could reasonably find for the non-movant.

Cornist v. B.J.T. Auto Sales, Inc., 272 F.3d 322, 326 (6th Cir. 2001) (internal citations and quotation marks omitted).

DuPont's claim of ownership to FAD2 rests on the basis of two contracts: the Faculty Manual and the RCA.[4] According to the Faculty Manual, WSU holds "ownership in patents and other non-patentable intellectual products . . . developed by its employees as a result of their employment." The parties do not dispute that this manual was a legally binding part of Okuley's employment contract with WSU. *See Thompson v. St. Regis Paper Co.*, 102 Wn.2d 219, 685 P.2d 1081, 1087 (Wash. 1984) (recognizing that under Washington law employment manuals can give rise to contractual claims). Under the RCA between DuPont and WSU, WSU's interest in FAD2 was transferred to DuPont. In combination, these

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[4] DuPont also argues that Okuley's personal assignment was legally valid and sufficient to transfer whatever interest in FAD2 remained with Okuley to DuPont. However, Okuley executed the assignment in reliance on DuPont's claims that he was legally obligated to do so. Whether these representations were accurate in turn depends on whether DuPont had a right to FAD2 before the assignment. Therefore this ground is not in fact independent and we do not reach it.

two contracts serve to transfer FAD2 from Okuley to WSU and from WSU to DuPont. Therefore DuPont owns FAD2. Against this conclusion, Okuley raises a series of objections.

Okuley's first and most novel objection is based on the fact that he discovered FAD2 while working under a WSU employment contract, but in an OSU laboratory and using OSU equipment. Under Ohio statutory law, "all rights to and interests in discoveries, inventions, or patents which result from research or investigation conducted in any . . . facility of any state college or university, . . . shall be the sole property of that college or university" Ohio Rev. Code § 3345.14(B). Therefore *ab initio* the ownership of FAD2 vested in OSU, not Okuley. Nevertheless, the Ohio statute did not abrogate Okuley's contract with WSU. Hence Okuley was also under an obligation to transfer FAD2 to WSU -an obligation he could not satisfy as at that time he did not own FAD2. Had matters rested in this posture, interesting, but quite different, litigation could have ensued involving WSU and OSU and including questions of the statute's constitutionality under the Takings Clause.

However, matters did not rest there. In 1993, at Okuley's insistence, OSU- as apparently is its practice- explicitly waived its rights to FAD2. If OSU's waiver was effective, releasing any statutory rights that it enjoyed, the site of the research and the statute ceased to have any effect on this case. However, even if, as Okuley argues, the mandatory language of the statute prevents OSU from waiving its interest in FAD2, the outcome is no different because the "waiver" also contained an assignment to Okuley of FAD2, an action undisputedly within OSU's power. This assignment enabled Okuley to fulfill his pre-existing contractual obligation to transfer FAD2 to WSU. Okuley argues that the assignment transferred FAD2 to him free and clear of any obligation. But

even setting aside the question of whether OSU had the authority to void a contract to which it was not a party and executed in another state, the language of the assignment is unambiguous. The assignment clearly states that it was "subject to any rights of [WSU] or its research sponsor [DuPont]." Therefore Okuley's obligation to give FAD2 to WSU remained unaltered by the Ohio statute and the OSU waiver/assignment.[5]

Next, Okuley claims that if FAD2 became property of WSU under the Faculty Manual, WSU failed to follow the manual's procedures and thus forfeited it back to him.[6] The Faculty Manual states that if WSU's "Intellectual Property Committee fails to notify the employee in writing of determination of ownership within fifty days of full disclosure, . . . the University's rights in the patentable property shall automatically become the property of the employee." It is a disputed question of fact whether Okuley made full disclosure to WSU, triggering the clause in the Faculty Manual. But even if the clause was triggered, it will

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[5] That Okuley was no longer an employee of WSU at the time the OSU waiver/assignment became effective is not relevant. Okuley's contractual obligation to give FAD2 to WSU, incurred during the lifetime of the contract, survived until fulfilled.

[6] Okuley now claims that his discovery was not covered under the Faculty Manual, because at the time of the discovery he was working at OSU and was using different methods than his WSU supervisor had suggested. However, it is undisputed that he was still an employee of WSU, using WSU and DuPont supplies, and working on the project that he had been given by his WSU supervisors. Moreover, he immediately communicated his success to his WSU supervisor and DuPont. Therefore, Okuley's claim of independence from WSU must fail. The Faculty Manual confirms this understanding.

not avail Okuley for several reasons. First, the Faculty Manual explicitly exempts property developed under an agreement with an outside sponsor from its return clause.[7] Second, the clause only vests WSU's rights back with the employee. However, under the collaboration agreement with DuPont, WSU did not have any rights in the property and only DuPont did. Therefore, WSU had nothing to return to DuPont.

Okuley also contends that the patent for FAD2 was based on additional "transformation work" that he performed after the end of the agreement between WSU and DuPont and that DuPont incorporated in later versions of its patent application. However, this transformation work was merely used to confirm the identity and use of FAD2 covered under the original patent application. As such it was, as the district court found, a simple extension of the original patent application and hence falls under the Faculty Manual's language regarding "intellectual products . . . developed by its employees as a result of their employment" and was assigned to WSU.

Okuley's final argument is based upon a reinterpretation of the RCA, to which he was not a party and with which all parties to the contract disagree. Under the RCA, almost all intellectual property rights arising from the research belongs to DuPont. However, under a clause of the RCA, if DuPont failed to isolate a gene resulting from the research within nine

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[7] Okuley raises the question that the collaboration agreement with DuPont was not a sponsorship agreement, because DuPont did not provide funds for the research. However, both WSU and DuPont construed the agreement as a sponsorship agreement and DuPont provided valuable consideration to WSU in the form of access to its database of genetic material.

months of the identification, and WSU succeeded where DuPont had failed, the gene would belong to WSU and DuPont would merely receive a license. Using strained definitions of the conditions that start the nine-month period, Okuley argues that it had expired before he even began his research. According to DuPont and WSU, Okuley's discovery of FAD2 started the period and DuPont was able to isolate the gene almost immediately thereafter. Even if Okuley had standing to challenge the interpretation of a contract to which the parties agreed, and his interpretation were correct, which seems highly unlikely, the effect would be merely to vest the property in WSU, not Okuley. For Okuley to obtain the patent, the court would also have to agree with the above argument regarding the reversion of the patent to Okuley by inaction of WSU. As we do not, this issue is moot.

IV

For the foregoing reasons, the judgment of the district court is AFFIRMED.

APPENDIX C

UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO,
EASTERN DIVISION

Case No. C2-97-1205

[Filed December 21, 2000]

Judge Holschuh
Magistrate Judge King

E.I. DU PONT DE NEMOURS AND COMPANY,
Plaintiff,

v.

DR. JOHN J. OKULEY,
Defendant.

MEMORANDUM AND ORDER

This is an action for declaratory and other relief to determine conflicting claims of ownership to a patentable invention arising from university research conducted by Defendant, Dr. John Okuley, and sponsored by Plaintiff, E.D. Du Pont de Nemours Co. ("Du Pont"). Jurisdiction is based on diversity of citizenship. This matter is currently before the Court on cross motions for summary judgment.

I. Background

This suit arose out of a Research Collaboration Agreement between Dr. John Browse, head of the Institute of Biological Chemistry at Washington State University ("WSU"), and Plaintiff Du Pont. Du Pont sought to isolate and clone certain genes that would be useful in engineering crop plants yielding vegetable oil containing a higher quality or quantity of beneficial fatty acids and lower quantities of saturated fats. If successful, Du Pont hoped to patent these genes. The Research Collaboration Agreement, drafted by Du Pont, was in the form of a letter to Dr. John Browse, dated December 14, 1989. It was accepted and signed by Dr. Browse, and approved by WSU on December 15, 1989. The relevant portions read as follows:

> Dear John:
>
> Based upon your discussions with John Pierce and Pablo Scolnik of E.I. du Pont de Nemours and Company ("Du Pont"), we are pleased to have you collaborate with us in efforts to identify lipid variations in tDNA-based *Arabidopsis* mutants. The terms and conditions we propose to conduct this Research Collaboration Agreement are set forth below:
>
> . . .
>
> 3. Your work under this Agreement shall be to collaborate in screening, identifying and cloning genes that affect seed lipid composition from among those *Arabidopsis* mutants made available to you by Du Pont.

4. For purposes of this Agreement the following definitions shall apply:

a. "Primary DNA" shall mean DNA isolated from *Arabidopsis* by the tDNA tagging method (mutant and corresponding wild type DNA).

b. "Secondary DNA" shall mean DNA isolated from any source using the Primary DNA as a probe. Secondary DNA shall further be classified as "homologous" if it determines substantially the same function(s) as that of the Primary DNA used to isolate it. Secondary DNA shall be classified as "heterologous" if it determines substantially different function(s) (that is, desaturation of a different fatty acyl group or desaturation of the same acyl group on a different lipid structure) from that of the Primary DNA used to isolate it. . .

5. The financial investment by Du Pont in developing "Biological Material," for example, DNA, RNA, genes, plasmids, constructs, protein products, callus, seeds, and any replication or derivative of the foregoing, is extremely high. Therefore, the following provisions will apply to rights to the Biological Materials.

a. Any Biological Material, including *Arabidopsis* tDNA mutants, made available to you during the term of the Agreement by Du Pont is the property of Du Pont. You shall use such Biological Material solely for research purposes in support of the work contemplated under this Research Collaboration Agreement with Du Pont. You and individuals working under your direction shall not transfer or give any such Biological Material or any portion

thereof to any third party without the prior written permission of Du Pont . . .

b. All Primary and Secondary DNA isolated from Biological Material is the property of Du Pont, except in the special cases defined in 5 d below.

c. Du Pont will have the first opportunity to use the Primary DNA to identify and clone the corresponding genes from oilseed crop species. If Du Pont is unsuccessful in cloning the corresponding genes from oilseed crop species within a period of nine (9) months following the isolation of the Primary DNA, then you are free to attempt similar work.

d. In the event you are successful in isolating

a. Secondary, heterologous DNA; or
b. Any secondary homologous DNA, that is isolated following the nine (9) month period specified in 5c above, Washington State University will own these properties.

e. Washington State University shall offer Du Pont a first right to refuse an exclusive license for the commercial use of the Secondary DNA isolated by you. Du Pont will inform Washington State University of its desire to obtain an exclusive license within six (6) months of the offer. Du Pont will negotiate in good faith reasonable royalties for the commercial use of this DNA.

6. You agree to communicate promptly to Du Pont any ideas and improvements that you conceive or make arising from your activities during the term of

> this Agreement and hereby assign all rights and title to such ideas and improvements to Du Pont, excepting rights and title to Secondary, heterologous DNA or Secondary homologous genes isolated by you as described in 5 d above. If Du Pont considers any ideas and improvements arising under this Agreement to be inventions on which Du Pont wishes to apply for United States or foreign patents, you shall at our request execute all papers we deem necessary or advisable for the filing and prosecution of such patent applications and for providing confirmation of Du Pont's legal title to the inventions, applications, and any patents granted . . .

(Ex. E to Pl.'s Mot. Summ. J.).

To summarize the terms of the agreement, the parties agreed to collaborate to isolate and clone genes that encode enzymes of a fatty acid desaturase ("FAD"). One way that isolation could be accomplished was to screen a large number of individual plants whose DNA has been chemically marked, or "tagged," at different places along the genetic structure. (Ex. B to Pl.'s Mot. Summ. J.). The plant *Arabidopsis* is often used for this purpose: Du Pont provided the tagged *Arabidopsis* mutants from its extensive collection.[1] The tagging process causes certain genetic characteristics to be enhanced or suppressed, allowing scientists to identify certain genes of interest. Fragments of the DNA are then chemically separated, and these strands are tested to confirm that the

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[1] This was not a typical sponsorship agreement. Rather than providing funding for the research, Du Pont provided access to a large library of biological material in the form of tagged *Arabidopsis* mutants.

gene which encodes a particular function or trait has, in fact, been discovered. (*Id.*).

Research on the project began in 1989. Jonathan Lightner, a Ph.D. candidate at WSU, worked with Browse on much of the initial research. In 1990, Du Pont scientists isolated the FAD3 gene, and Du Pont filed a patent application naming Dr. Browse as a co-inventor of FAD3. In accordance with the Research Collaboration Agreement, he executed an assignment of his rights in the invention to Du Pont. Researchers continued to look for the FAD2 gene.[2]

In November of 1991, Defendant Dr. Okuley enrolled as a post-doctoral researcher at WSU and began working on the Du Pont project under Dr. Browse's supervision. Okuley was paid by WSU and was subject to the terms and conditions of WSU's Faculty Manual, including the patent policy. The policy imposed a duty on employees to disclose "all potentially patentable inventions and discoveries developed while employed at WSU to the Intellectual Property Committee for review." It also provided that, unless agreed otherwise with an outside sponsor, WSU "shall own the right to all patentable property developed as a result of University employment." (Compl. PP 10-12). In addition, it explicitly stated that the proprietary rights of the university and its employees are subject to the terms of outside sponsorship agreements.

When Okuley arrived at WSU, Jonathan Lightner told him about prior work done by Ken Feldmann, a scientist at Du Pont, and Mary Aegerter, a post-doctoral faculty member at

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[2] For a time, Du Pont scientists believed that they had also isolated the FAD2 gene; however, they were mistaken.

WSU, on a particular strain of *Arabidopsis* mutant known as "line 658-75." Both Feldmann and Aegerter had isolated line 658-75 and believed that it could be tagged for the FAD2 gene but, because they were unable to clone or sequence the gene, they eventually abandoned the research. Lightner told Okuley that he thought that, although Feldmann's and Aegerter's research was inconclusive, it was still possible that line 658-75 may be tagged for the FAD2 gene. Lightner had conducted experiments to test the validity of Feldmann's experiments, had grown FAD2 mutant plants of line 658-75, and had ground up some of these plants to obtain DNA. He had then abandoned the project to devote more time to his dissertation. Lightner gave Okuley the remaining seed and DNA samples obtained from line 658-75.

Shortly after Okuley arrived at WSU, he and Dr. Browse visited Du Pont's laboratories in Wilmington, Delaware to discuss the project. (Okuley Dep. at 77-78). Dr. Browse believed that the best way to proceed with attempts to isolate the FAD2 gene was to use a "low stringency probe" process using samples of the FAD3 gene, since earlier research on line 658-75 had been inconclusive. However, while waiting for Du Pont to send samples of the FAD3 gene, Dr. Okuley did further research on line 658-75. In December of 1991, Okuley was able to "rescue" a single plasmid known as "plasmid 658-1." Okuley did not know it at the time, but this strand was later determined to encode a partial sequence of the FAD2 gene. Once he received samples of FAD3 from Du Pont, Okuley put his lab dish containing plasmid 658-1 in a freezer and, for the next six months, proceeded to conduct research using the low stringency probe method preferred by Dr. Browse. His efforts were unsuccessful.

In the summer of 1992, Dr. Okuley moved to Columbus, Ohio. At Dr. Browse's suggestion, he obtained "visitor"

access to Dr. Keith Davis's laboratory facilities at The Ohio State University ("OSU") so that he could continue his research on the Du Pont project. Browse informed Okuley that he could not take any of Du Pont's biological material with him to OSU without Du Pont's approval. Browse testified that once he obtained Du Pont's permission, he sent the biological material, including the dish of plasmid 658-1, to Okuley at OSU where Okuley continued to work on the project. Linda Floyd, a staff attorney at Du Pont, denies that she gave Browse permission for Okuley to work on the project at OSU. (Floyd Aff. P 2). Although Browse and Floyd had some discussion concerning the advisability of an agreement between Du Pont, WSU and OSU concerning patent rights, the parties agree that no such contract was ever drafted.

During his time at OSU, Okuley was still employed by WSU and continued to be supervised by Dr. Browse, communicating with him via telephone, e-mail and fax. (Compl. P 13). In August of 1992, while at OSU, without the knowledge or approval of either Browse or Du Pont, Okuley decided to pursue further experiments with line 658-75. Within weeks after embarking down this path of research, Okuley discovered and isolated the FAD2 gene and proceeded to clone it. (Okuley Dep. at 164). On or about August 26, 1992, Okuley notified Dr. Browse that he had isolated the FAD2 gene. By September 12, 1992, Okuley had completed sufficient sequencing to know for certain that he had cloned the FAD2 gene. Browse then directed him to send a sample of the partial sequence of the DNA clone to Du Pont, which Okuley did on September 22, 1992. By October 16, 1992, Du Pont scientists had completed the DNA sequence for FAD2 in *Arabidopsis*, and had isolated and cloned sequences for FAD2 in soybean and canola seeds. That same month, Du Pont decided to patent the invention.

Du Pont attorney Linda Floyd was in charge of preparing the patent application. She collected information from Okuley, Browse, Lightner, and several Du Pont scientists concerning inventorship. On November 17, 1992, Du Pont filed an application for the FAD2 gene invention; it was called "Fatty Acid Desaturase Genes from Plants." The initial application listed Dr. Lightner and Dr. Naren Yadav of Du Pont as co-inventors. Okuley suspected that he was not listed only because no agreement had ever been executed concerning his work at OSU. (Okuley Dep. at 209). He protested, but Ms. Floyd refused to add Okuley's name.

In January of 1993, Okuley approached Jim Wilkens of OSU's intellectual property office to discuss the matter. Wilkens informed Okuley that since he was using OSU's laboratories, he had a statutory duty to report all potentially patentable inventions to OSU. Okuley also discussed the matter of inventorship with Larry Simonsmeier, the chief intellectual property officer at WSU. Lightner wrote to Floyd on January 21, 1993 expressing his concern that Okuley's name was not included as an inventor. (Ex. 25 to Def.'s Mot. Summ. J.). In February of 1993, after further consideration, Ms. Floyd decided she should remove Dr. Yadav's name from the patent application, but still refused to include Okuley's name. That spring, Bruce Morrissey, another Du Pont attorney, took over the processing of the patent application when Floyd took maternity leave. In April of 1993, Lightner refused to sign the Declaration of Inventorship unless Dr. Okuley's name was included as a joint inventor. Morrissey reviewed the matter and agreed that Okuley's name should be added.[3]

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[3] On June 23, 1993, Bruce Morrissey filed an amendment to the original patent application adding Okuley's name and deleting

Morrissey then informed Okuley that, pursuant to the terms of the Research Collaboration Agreement, Okuley was obligated to assign his interest in FAD2 to Du Pont. On May 12, 1993, he sent Okuley the documents to be signed. Before he executed the assignment, Dr. Okuley obtained from Jim Wilkens of OSU a waiver of any claims OSU may have to the invention because of Okuley's work in its labs. The May 28, 1993 assignment read as follows:

> Dear Dr. Okuley:
>
> Upon the recommendation of Dr. James Wilkens of our Office of Technology Transfer, and in view of the circumstance that your contributions to this invention were partly made while you were at Washington State University and that any contributions to this invention made while you were a visitor in Prof. Keith Davis' laboratory at Ohio State University were made by you in your capacity as an employee of Washington State University, The Ohio State University hereby waives any claim it might have in this invention and in any patent rights therein, and transfers the same to you, subject to any rights of Washington State University or its research sponsor, E.I. du Pont de Nemours, Inc.

(Ex. 31 to Def.'s Mot. Summ. J.).

On the same date, Okuley executed a standard form assignment transferring to Du Pont his "entire right, title and interest in" FAD2, and agreeing to "execute all applications, papers or instruments necessary or required" in order for Du Pont to obtain and enforce proper patent protection for the

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Yadav's name. (Ex. U to Pl.'s Mot. Summ. J.).

invention. (Ex. R to Pl.'s Mot. Summ. J.). In connection with that assignment, he also executed a Declaration of Inventorship stating that he and Jonathan Lightner were co-inventors, and a Power of Attorney which allowed Linda Floyd to act as his attorney in processing the patent application and transacting business with the Patent and Trademark Office. (Ex. S to Pl.'s Mot. Summ. J.).[4] Okuley returned these documents to Morrissey with a cover letter that stated in part, "I feel that the naming of Jonathan Lightner and myself as inventors truely [sic] reflects the inventorship . . . I have executed this assignment because both Linda Floyd with Du Pont-Legal and yourself have advised me that it is my obligation to do so."

After sending the FAD2 sample to Du Pont in the fall of 1992, Okuley continued to work on the project at OSU until June 1, 1993, confirming the identity of the FAD2 gene by "transforming" a FAD2 chimeric gene construct into an *Arabidopsis* FAD2 mutant. According to Okuley, this created generalized claims that the FAD2 gene was capable of genetically engineering an oil producing crop plant; these claims allegedly formed the basis for the specialized claims involving other plant species, which arose from experiments conducted by the Du Pont scientists. In June of 1993, Okuley moved back to Washington and began to prepare his data for publication. In the fall of that year, Okuley accepted a position at Denison University and left WSU.

In November of 1993, Du Pont decided to file a Continuation in Part ("CIP") application, otherwise known as the 1043A patent, which augmented the initial patent

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[4] Lightner executed similar documents.

application.[5] It expanded the scope of the original claims to include FAD2 sequences from corn and castor, and added new data to support the original claims. (Ex. W to Pl.'s Mot. Summ. J.; Christenbury Aff. P 3).[6] In connection with the 1043A application, Du Pont requested that Okuley and Lightner execute another standard form assignment conveying rights to Du Pont.[7] Lightner promptly executed his; Okuley did not.

On December 3, 1993, Okuley e-mailed Morrissey, indicating that he had not yet had time to review the CIP application. (Ex. Y to Pl.'s Mot. Summ. J.). Okuley expressed concern about how much he was contractually

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[5] A continuation-in-part ("CIP") is an application filed during the lifetime of an earlier nonprovisional application, repeating some substantial portion or all of the earlier nonprovisional application and adding matter not previously disclosed. *In re Klein*, 1930 C.D. 2, 393 O.G. 519 (Comm'r Pat. 1930). It may or may not claim new subject matter. CIP applications may claim the benefit of the filing date of the parent application only with respect to subject matter that was adequately disclosed in the parent application.

[6] The 1043A application was eventually withdrawn in favor of filing the 1043D application. (Christenbury Aff. P 3).

[7] According to Du Pont, Dr. Okuley was not directly involved in this additional work. (Compl. P 17). However, Du Pont claims that it is the custom and practice before the Patent and Trademark Office to have all persons listed as inventors on the original patent application execute new declarations and assignments when a CIP is filed.

Okuley contends that his transformation data, conducted between September of 1992 and May of 1993, forms the basis for these additional claims.

obligated to do in connection with the patent, noting that he no longer had a lot of time to devote to it. He also wrote, "I understand that it is your personal opinion that I am covered by the agreement with John Browse and Washington State University . . . If, as it states in the declaration, you are acting as my lawyer, I would appreciate your advising me on these concerns."[8] Morrissey responded that he did not anticipate that Okuley would need to devote much more time to the patent. He also told Okuley that he was obligated to assign his rights in the invention to Du Pont.

Then, without Du Pont's knowledge, Okuley altered the assignment so as to require Du Pont to pay Okuley a "reasonable royalty" for use of the invention.[9] (Ex. Z to Pl.'s Mot. Summ. J.). Okuley executed this altered assignment on December 30, 1993 and returned it, without a cover letter, to Morrissey. Morrissey did not notice the alterations, and simply placed the assignment in Okuley's file at Du Pont.

In June of 1994, Du Pont filed a second CIP, also known as the 1043B patent application, which added additional

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[8] The "declaration" refers to the Declaration and Power of Attorney executed by Okuley so that Du Pont's legal counsel could prosecute the patent application on his behalf.

[9] Plaintiff claims that Okuley went to great pains to use a nearly identical font, type-size, and page set-up to make the altered assignment look as much as possible like the original one. Okuley claims that he attempted to duplicate the format so that Morrissey could not object to the document on those grounds. He testified that he fully expected Morrissey to read the document and then call him to discuss it. (Okuley Dep. at 276).

examples.[10] In connection with this CIP, Barbara Siegell, another Du Pont attorney, asked Okuley to re-execute the standard forms. (Ex. AA to Pl.'s Mot. Summ. J.). Okuley did not respond. After receiving a second letter from Ms. Siegell in September of 1994, Okuley executed another Declaration and Power of Attorney, but not another assignment. Okuley allegedly explained to Siegell that he had already executed an assignment which entitled him to receive royalties. After retrieving the modified assignment from Okuley's file, Siegell told Okuley that Du Pont had not noticed that the earlier assignment had been modified, but that the royalty provision inserted by him was unacceptable. (Okuley Dep. at 283-87). Dr. Okuley has refused to execute another assignment unless Du Pont agrees to pay him a royalty on any commercial exploitation of the patent. (Compl. PP 19-21).

Okuley then hired an attorney. In March of 1995, Okuley's counsel urged WSU to negotiate a licensing agreement with Du Pont. (Ex. EE to Pl.'s Mot. Summ. J.). WSU refused to do so. Larry Simonsmeier of WSU replied that, pursuant to the Research Collaboration Agreement and the WSU Faculty Manual, Du Pont was the rightful owner of the invention and no royalty arrangements were warranted. (Ex. 33 to Def.'s Mot. Summ. J.). In March of 1996, WSU subsequently assigned its rights in the invention, as well as its claims against Okuley, to Du Pont. (Ex. GG & HH to Pl.'s Mot. Summ. J.).

In 1997, Du Pont filed suit alleging three causes of action: (1) Du Pont requests a declaratory judgment that Okuley has no legal interest in the invention and is contractually obligated

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[10] The 1043B application was also later withdrawn in favor of the 1043D application. (Christenbury Aff. P 4).

to assign his rights to Du Pont; (2) As assignee of claims which arose out of the employment relationship between WSU and Okuley, and an intended third party beneficiary of that employment agreement, Du Pont also alleges that Okuley breached his employment contract with WSU by refusing to execute the necessary assignments in connection with the CIP applications, and requests specific performance; and (3) Du Pont alleges a breach of Okuley's common law duty to assign to WSU his rights in the invention, and again seeks specific performance. Du Pont claims standing to enforce WSU's rights both as the assignee of WSU's claims, and under the Research Collaboration Agreement.

Okuley filed a third party complaint against WSU, which this Court later dismissed. Okuley also filed the following counterclaims against Du Pont: (1) since Okuley executed the initial assignment under duress, by mistake, without benefit of counsel, and because he was misled by Du Pont and WSU with respect to his obligation to assign his invention to Du Pont, the assignment is null and void and should be rescinded; (2) since the invention was made outside the scope of his assigned duties with WSU, neither Du Pont nor WSU have any ownership interest in the invention. Rather he claims that ownership vested in him under the common law of the State of Ohio and, since Ohio State University released all of its rights to him, he is now the sole owner of the invention; (3) even if WSU once had an ownership interest in the invention, title now vests fully in him because WSU breached its employment agreement with him; (4) even if WSU once had an ownership interest in the invention, title now vests fully in him because WSU failed to follow up on the invention as required in the Faculty Manual; (5) even if WSU once had an ownership interest in the invention, title now vests fully in him because WSU failed to license the invention as required by § 5e of the Materials Transfer Agreement; (6) because

Okuley undertook this work on his own initiative and without the assistance of any other individual, he is the sole inventor, and the sole owner of the invention in question. He requests declaratory and other relief to vest in him full right, title, and interest to the FAD2 gene.

In September of 1998, Du Pont filed another CIP, also known as the 1043D patent application, and withdrew the 1043A and 1043B applications. The 1043D application lists Dr. Okuley and Dr. Lightner as co-inventors. However, Du Pont now also wants to add four other Du Pont scientists, who contributed to the isolation of FAD2 in non-*Arabidopsis* species, as co-inventors. (Christenbury Aff. P 5). It appears that Dr. Okuley has refused to consent to this correction of inventorship and, in light of Okuley's persistent refusal to execute earlier assignments, Du Pont has not asked Okuley to execute an assignment in connection with the 1043D CIP application.

II. Standard for Granting Summary Judgment

Federal Rule of Civil Procedure 56(c) provides:

> [Summary judgment] . . . shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to judgment as a matter of law.

"This standard provides that the mere existence of some alleged factual dispute between the parties will not defeat an otherwise properly supported motion for summary judgment; the requirement is that there be no genuine issue of material fact." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247-

48, 106 S. Ct. 2505, 91 L. Ed. 2d 202 (1986) (emphasis in original); *Kendall v. Hoover Co.*, 751 F.2d 171, 174 (6th Cir. 1984).

Summary judgment will not lie if the dispute about a material fact is genuine; "that is, if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson*, 477 U.S. at 248. The purpose of the procedure is not to resolve factual issues, but to determine if there are genuine issues of fact to be tried. *Lashlee v. Sumner*, 570 F.2d 107, 111 (6th Cir. 1978). Therefore, summary judgment will be granted "only where the moving party is entitled to judgment as a matter of law, where it is quite clear what the truth is . . . [and where] no genuine issue remains for trial, . . . [for] the purpose of the rule is not to cut litigants off from their right of trial by jury if they really have issues to try." *Poller v. Columbia Broadcasting Sys.*, 368 U.S. 464, 467, 82 S. Ct. 486, 7 L. Ed. 2d 458 (1962) (*quoting Sartor v. Arkansas Natural Gas Corp.*, 321 U.S. 620, 627, 64 S. Ct. 724, 88 L. Ed. 967 (1944)); *accord County of Oakland v. City of Berkley*, 742 F.2d 289, 297 (6th Cir. 1984).

In making this inquiry, the standard to be applied by the Court mirrors the standard for what was formerly referred to as a directed verdict. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323, 106 S. Ct. 2548, 91 L. Ed. 2d 265 (1986); *Anderson*, 477 U.S. at 250.

> The primary difference between the two motions is procedural; summary judgment motions are usually made before trial and decided on documentary evidence, while directed verdict motions are made at trial and decided on the evidence that has been admitted." *Bill Johnson's Restaurants, Inc. v. NLRB*,

> 461 U.S. 731, 745, n.11, 103 S. Ct. 2161, 76 L. Ed. 2d 277 (1983). In essence, though, the inquiry under each is the same: whether the evidence presents a sufficient disagreement to require submission to a jury or whether it is so one-sided that one party must prevail as a matter of law.

Anderson, 477 U.S. at 251-52. Accordingly, although summary judgment should be cautiously invoked, it is an integral part of the Federal Rules, which are designed "to secure the just, speedy and inexpensive determination of every action." *Celotex*, 477 U.S. at 327 (*quoting* Fed. R. Civ. P. 1).

In a motion for summary judgment the moving party bears the "burden of showing the absence of a genuine issue as to any material fact, and for these purposes, the [evidence submitted] must be viewed in the light most favorable to the opposing party." *Adickes v. S.H. Kress & Co.*, 398 U.S. 144, 157, 90 S. Ct. 1598, 26 L. Ed. 2d 142 (1970) (footnote omitted); *accord Adams v. Union Carbide Corp.*, 737 F.2d 1453, 1455-56 (6th Cir.), *cert. denied* , 469 U.S. 1062, 105 S. Ct. 545, 83 L. Ed. 2d 432 (1984). Inferences to be drawn from the underlying facts contained in such materials must also be considered in the light most favorable to the party opposing the motion. *United States v. Diebold, Inc.*, 369 U.S. 654, 655, 82 S. Ct. 993, 8 L. Ed. 2d 176 (1962); *Watkins v. Northwestern Ohio Tractor Pullers Ass'n*, 630 F.2d 1155, 1158 (6th Cir. 1980). Additionally, "unexplained gaps" in materials submitted by the moving party, if pertinent to material issues of fact, justify denial of a motion for summary judgment. *Adickes*, 398 U.S. at 157-60.

If the moving party meets its burden and adequate time for discovery has been provided, summary judgment is

appropriate if the opposing party fails to make a showing sufficient to establish the existence of an element essential to that party's case and on which that party will bear the burden of proof at trial. *Celotex*, 477 U.S. at 322. The existence of a mere scintilla of evidence in support of the opposing party's position is insufficient; there must be evidence on which the jury could reasonably find for the opposing party. *Anderson*, 477 U.S. at 252.

> When a motion for summary judgment is made and supported as provided in this rule, an adverse party may not rest upon the mere allegations or denials of the adverse party's pleading, but the adverse party's response, by affidavits or as otherwise provided in this rule, must set forth specific facts showing that there is a genuine issue for trial. If the adverse party does not so respond, summary judgment, if appropriate, shall be entered against the adverse party.

Fed. R. Civ. P. 56(e).

III. Discussion

Both parties have moved for summary judgment. Plaintiff contends: (1) having previously declared under oath that he is the co-inventor of FAD2, and that Du Pont owns the invention, Defendant is estopped from claiming otherwise absent proof of fraud or other misconduct by Du Pont; (2) under the Research Collaboration Agreement between Du Pont and WSU, ownership of FAD2 rests with Du Pont; (3) as an employee and faculty member of WSU, Defendant was bound by the terms of the Faculty Manual and was thus subject to the Research Collaboration Agreement; and (4) because no patent has yet been issued, and because Defendant has not established any ownership interest in the invention,

Defendant has no standing to seek a determination that he is the sole inventor.

Defendant claims that he is entitled to summary judgment for the following reasons: (1) because Defendant used OSU's equipment and facilities, OSU was the sole owner of the FAD2 gene invention and it assigned its rights to Defendant, who was the sole owner of the invention at the time of the assignment; (2) Defendant's original assignment of rights to Du Pont is invalid because it was fraudulently induced; (3) Defendant's assignment of rights to Du Pont is void under the doctrine of mutual mistake; (4) Defendant is the sole inventor of the FAD2 gene because he is the only person who made a significant contribution to the invention; and (5) Defendant is the sole inventor, or at least a joint inventor, of the inventions set forth in later patent applications, which Defendant has never assigned to Du Pont.

A. Who is the Inventor?

Defendant claims that before the Court can determine who is the rightful owner of the FAD2 invention, the Court must first determine who invented FAD2 because ownership follows inventorship. Although Dr. Lightner and Dr. Okuley are listed as co-inventors on the patent application, Okuley now claims that Lightner's name should be excluded because Lightner's suggestion that Okuley pursue a particular line of research did not constitute a significant contribution to the invention. In response, Du Pont asserts two arguments: 1) the doctrine of assignor estoppel precludes Okuley from claiming Lightner is not a co-inventor; and 2) this Court has no jurisdiction to determine inventorship because the patent has not yet issued. Specifically, Du Pont claims that since no patent has issued, Okuley is limited to the administrative remedies found in 35 U.S.C. § 116. In the alternative, Du

Pont argues that since Okuley has already assigned any ownership interest that he might have previously had in the invention, he has no standing to challenge the determination of inventorship. Finally, Du Pont argues that even if Okuley had standing, the Court should still find that he was not the sole inventor of FAD2.

The doctrine of assignor estoppel is an equitable doctrine that generally precludes someone who has assigned patent rights to another from claiming that the patent is invalid. *Diamond Scientific Co. v. Ambico, Inc.*, 848 F.2d 1220, 1224 (Fed. Cir. 1988). Okuley argues that the doctrine is inapplicable because he is not challenging the validity of the patent, but rather the determination of inventorship and the validity of his assignment to Du Pont. Du Pont nevertheless claims that the doctrine should be applied in this case. Under oath, Dr. Okuley has executed two Declarations stating that he and Dr. Lightner were co-inventors. He also stated in a cover letter to Bruce Morrissey that he believed that "the naming of Jonathon Lightner and myself as inventors truely [sic] reflects the inventorship of the claimed subject matter." (Ex. Q to Pl.'s Mot. Summ. J.). Plaintiff cites two patent infringement cases in which inventors who made statements concerning inventorship in their Declarations were barred by the doctrine of assignor estoppel from later claiming that those statements were inaccurate because "equity cannot aid the violator of an oath." *Carroll Touch, Inc. v. Electro Mechanical Sys., Inc.*, 15 F.3d 1573, 1581 (Fed. Cir. 1993); *Shamrock Technologies, Inc. v. Medical Sterilization, Inc.*, 903 F.2d 789, 795 (Fed. Cir. 1990).

The Court believes that, if this patent had already issued, the doctrine of assignor estoppel would apply to bar Okuley's claims that Dr. Lightner's name should be excluded as a co-inventor of the FAD2 gene. However, since no patent has

issued, the Court cannot apply the doctrine because it has no jurisdiction to consider Okuley's claims concerning inventorship. Patent law provides two avenues for correcting inventorship. If a patent has already been issued, 35 U.S.C. § 256 provides the following remedy:

> Whenever through error a person is named in an issued patent as the inventor, or through error an inventor is not named in an issued patent and such error arose without any deceptive intention on his part, the Director may, on application of all the parties and assignees, with proof of the facts and such other requirements as may be imposed, issue a certificate correcting such error.
>
> The error of omitting inventors or naming persons who are not inventors shall not invalidate the patent in which such error occurred if it can be corrected as provided in this section. The court before which such matter is called in question may order correction of the patent on notice and hearing of all parties concerned and the Director shall issue a certificate accordingly.

The parties agree that this statute does not apply because no patent has yet been issued.

When parties seek to correct inventorship on a patent application that is still pending, 35 U.S.C. § 116 applies instead. It provides, in relevant part:

> Whenever through error a person is named in an application for patent as the inventor, or through error an inventor is not named in an application, and such error arose without any deceptive intention on his part, the Director may permit the application to be

> amended accordingly, under such terms as he prescribes.

Although 35 U.S.C. § 256 specifically grants a court authority to order that the patent be corrected, § 116 contains no such provision; before a patent issues, only the Director may authorize the amendment. In *Dee v. Aukerman*, 625 F. Supp. 1427 (S.D. Ohio 1986), a § 256 suit, the Court had to decide whether, in the absence of a challenge to a patent's validity, it had subject matter jurisdiction to resolve an inventorship dispute and order correction of an error. The Court found that it did have jurisdiction, noting, "While § 256 does not expressly provide for such an entry into court . . . nonetheless the statute does make reference to correction by the district court, while cryptically omitting precisely when such a court may take jurisdiction." *Id.* at 1429.

This case is distinguishable from *Dee*. As noted, although § 256 at least impliedly grants district courts authority to order correction of inventorship on an issued patent, there is no similar grant of jurisdiction in § 116. As another district court recently noted, "A court may correct the listed inventors on a United States Patent; correction of pending applications for a United States Patent lies with the Commissioner." *Chou v. Univ. of Chicago*, 2000 U.S. Dist. LEXIS 2002, *5, No. 99 C4495, 2000 WL 222638 at *2 (N.D. Ill. Feb. 22, 2000).

The Court realizes that this essentially leaves Dr. Okuley without recourse to challenge inventorship until the patent issues. Federal regulations governing amendment of inventorship while a patent is still pending require the consent of each person being added or deleted as an inventor and consent of the assignee. 37 C.F.R. § 1.48(a). It appears unlikely that either Dr. Lightner or Du Pont would be willing

to consent to having Dr. Lightner's name removed from the patent application.[11] However, despite Okuley's apparent lack of remedy, the Court's hands are tied.[12] Absent evidence of any authority conferring jurisdiction on this Court to resolve the inventorship issue while the patent is still pending, the Court cannot grant the relief requested by Okuley.

Despite the absence of a specific grant of jurisdiction in § 116, Okuley claims that this Court's jurisdiction to decide whether Lightner's name is properly included as a co-inventor is based on Plaintiff's Complaint because, pursuant to 28 U.S.C.A. § 1338, "district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trademarks." This jurisdiction, however, extends "only to those cases in which a well-pleaded complaint establishes either that federal patent law creates the cause of action or that the plaintiff's right to relief necessarily depends on resolution of a substantial question of federal

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[11] It also appears unlikely that Dr. Okuley will consent to having the four other Du Pont scientists names added as co-inventors.

[12] This is distinguishable from *Dee*. In that case, Defendants argued that Plaintiff's action should be dismissed because she had failed to exhaust her administrative remedies before the patent commissioner as outlined in the federal regulations. The Court disagreed. It noted that the administrative remedies required the consent of all parties before any correction could be made. Since Plaintiff was unable to obtain Defendants' consent to the correction, the administrative remedies were not available to her. The Court therefore refused to dismiss the action based on failure to exhaust administrative remedies, noting that § 256 expressly requires only notice and a hearing. *Dee*, 625 F. Supp. at 1430. As noted, § 116 contains no provision for judicial review.

patent law, in that patent law is a necessary element of one of the well-pleaded claims." *Christianson v. Colt Indus. Operating Corp.*, 486 U.S. 800, 809, 108 S. Ct. 2166, 100 L. Ed. 2d 811 (1988).

In this case, federal patent law does not provide the basis for any of Plaintiff's claims. In fact, Plaintiff invoked this Court's jurisdiction not on the basis of claims arising out of federal patent law, but on the basis of diversity of citizenship. Since federal patent law does not create the cause of action, Okuley must show that Du Pont's right to relief necessarily depends on resolution of a substantial question of federal patent law. He cannot.[13] Here, Du Pont seeks a declaratory

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[13] The cases cited by Okuley are distinguishable. In *Rustevader Corp. v. Cowatch*, 842 F. Supp. 171 (W.D. Pa. 1993), a father and son were issued a patent as joint inventors. The son's employer then filed suit in state court seeking an order compelling assignment of the patent. Defendants removed the case to federal court. Plaintiff argued that the court had no subject matter jurisdiction because this involved strictly a matter of state contract law. The court disagreed. Since the father, who was listed as one of the joint inventors, was not a party to the employment agreement, the court could not compel assignment based solely on contract law unless it first determined that the son was the sole inventor; this, in turn, raised a substantial federal question involving patent law, making jurisdiction proper under 28 U.S.C. § 1338. The court explicitly noted that if the son were the only defendant, it would not have jurisdiction. *Id.* at 173. In this case, both Dr. Okuley and Dr. Lightner are bound by the same contract--the WSU Faculty Manual-- and Plaintiff's claims are limited to an interpretation of that contract.

In *MCV, Inc. v. King-Seeley Thermos Co.*, 870 F.2d 1568 (Fed. Cir. 1989), the patent had already issued and the suit for

judgment that, pursuant to the Research Collaboration Agreement and the WSU Faculty Manual, it is the rightful owner of legal title to the FAD2 invention, and that Dr. Okuley is legally obligated to execute the assignments necessary to process the patent application. Plaintiff, as assignee of claims previously held by WSU, also states a claim for breach of the employment contract between Dr. Okuley and WSU, and a breach of Okuley's common law duty to assign rights in FAD2 to WSU.

Each of Plaintiff's claims turns strictly on contract law, requiring an interpretation of Okuley's duty to execute the assignment based on the Research Collaboration Agreement and the WSU Faculty Manual. It is well settled that contract disputes involving an underlying patent do not "arise under" patent law as required by 28 U.S.C. § 1338(a). *Beghin-Say Int'l, Inc. v. Ole-Bendt Rasmussen*, 733 F.2d 1568, 1571 (Fed. Cir. 1984); *Boggild v. Kenner Products*, 853 F.2d 465, 468 (6th Cir. 1988)(distinguishing patent claims arising under patent laws from contract claims in which patent issues are incidentally implicated). The fact that one of Okuley's counterclaims, seeking a declaration that he is the sole inventor of FAD2, may depend on resolution of a substantial question of federal patent law is irrelevant because, under the well-pleaded complaint rule, the Court may look only to Plaintiff's complaint and not to any defenses or counterclaims asserted by the Defendant. *Rath Packing Co. v. Becker*, 530 F.2d 1295, 1303 (9th Cir. 1975), *aff'd on other grounds*, 430 U.S. 519, 97 S. Ct. 1305, 51 L. Ed. 2d 604 (1977); *Leatherman Tool Group, Inc. v. Cooper Indus., Inc.*, 131 F.3d 1011, 1013-14 (Fed. Cir. 1997).

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correction of ownership was brought under § 256, which provided the proper jurisdictional basis.

Furthermore, resolution of the inventorship issue is not required in order to decide the other issues contained in the cross motions for summary judgment. Both parties agree that Okuley is one of the inventors of FAD2. As an inventor, ownership rights initially vested in him. *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993). The central question in this case focuses on the impact of the Research Collaboration Agreement, the WSU Faculty Manual, and Ohio Revised Code § 3345.14(B) on Okuley's obligation to assign his interests in the invention to Du Pont, and to execute additional assignments in connection with the CIP applications. Whether Okuley is listed as the sole inventor or as a co-inventor of FAD2 is simply irrelevant to those issues. Because Plaintiff's claims do not arise under federal patent law, and because Plaintiff's right to relief does not necessarily depend on resolution of a substantial question of federal patent law, the Court finds that 28 U.S.C. § 1338 provides no authority for this Court to determine whether Okuley is the sole inventor of FAD2.

Even if the Court had jurisdiction to consider his claim of sole inventorship, Dr. Okuley faces two other insurmountable obstacles. First, the fact that he has assigned his entire interest in FAD2 to Du Pont is fatal to his claim.[14] Having relinquished all rights in the invention, he no longer has standing to challenge the named inventors because he has no cognizable injury. *Kucharczyk v. Regents of Univ. of Cal.*, 48 F. Supp. 2d 964, 973-75 (N.D. Cal. 1999); *Chou v. Univ. of Chicago*, 2000 U.S. Dist. LEXIS 2002, 2000 WL 222638 at *2. Du Pont, as the assignee, is the only party that can now

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[14] As the Court finds below, Okuley did have a duty to assign his rights in the FAD2 invention to Du Pont and that assignment was valid.

challenge Lightner's inclusion as a co-inventor. Second, the doctrine of equitable estoppel operates to bar Okuley's challenge to inventorship since he waited five years before protesting the inclusion of Dr. Lightner's name as a co-inventor. *MCV, Inc. v. King-Seeley Thermos Co.*, 870 F.2d 1568, 1571-74 (Fed. Cir. 1989).

Okuley also seeks to challenge Du Pont's failure to include him as an inventor on CIP applications 1043A, 1043B, and 1043D. He claims that since his generalized invention forms the foundation for all of Du Pont's new claims, he should be listed as the sole inventor, or at least as a co-inventor on each CIP application. Again, the Court finds that it lacks jurisdiction to consider this claim or to grant Okuley the remedy requested. Whether Okuley has a right to be listed as the inventor or co-inventor on the CIP applications involves the same questions raised by his claim that he should be found to be the sole inventor on the original application. The reasons discussed above for denying Okuley's claim that he be found to be the sole inventor on the original application apply with equal force to a denial of his claim that he be found to be the sole inventor or co-inventor on the CIP applications.

B. Who has ownership rights in the invention?

As noted earlier, absent any agreements to the contrary, ownership rights in an invention initially vest in the inventor or inventors. The inventors are then free to assign their ownership rights to others, usually for a profit. In this case, no one disputes that Dr. Okuley is one of the inventors of the FAD2 gene. However, there are two documents and one statute that potentially intercepted the vesting of ownership rights in the FAD2 gene in Dr. Okuley: 1) Ohio Revised Code § 3345.14(B); 2) the Research Collaboration Agreement

between Dr. Browse and Du Pont; and 3) the Washington State University Faculty Manual. The Court will discuss each of these in turn.

1. Ohio State University

Although he was still an employee of Washington State University, Dr. Okuley was conducting his research in a laboratory at The Ohio State University when he discovered the FAD2 gene. Ohio Revised Code § 3345.14(B) states:

> All rights to and interests in discoveries, inventions, or patents which result from research or investigation conducted in any experiment station, bureau, laboratory, research facility, or other facility of any state college or university . . . shall be the sole property of that college or university. No person, firm, association, corporation, or governmental agency which uses the facilities of such college or university in connection with such research or investigation . . . shall have any rights to or interests in such discoveries or inventions, including income therefrom, except as may, by determination of the board of trustees of such college or university, be assigned, licensed, transferred, or paid to such persons or entities . . .

Since the discovery of FAD2 undisputably resulted from research conducted in a laboratory at OSU, a public institution, under the plain language of the statute, OSU would have a legitimate claim to sole ownership of the invention. When Okuley discussed his invention with Jim Wilkens of OSU's Technology Transfer Office, Wilkens indicated that Okuley had a duty to disclose the invention to OSU and that,

> pursuant to this statute, OSU had the right to assert a claim to the invention. Based on what Wilkens told him, Okuley refused to execute his assignment to Du Pont until OSU waived its rights in the invention. (Morrissey Aff. P 6).

Okuley now claims that this statute cut off any claims of ownership that may be asserted by WSU or Du Pont. The Court disagrees. OSU was aware that Okuley was an employee of WSU, was being paid by WSU, and was conducting research in connection with a sponsorship agreement with Du Pont. Based on that knowledge, although OSU clearly had a right to assert a claim, it chose not to assert any ownership rights in the FAD2 gene. Instead, OSU willingly executed an assignment of any ownership rights it may have been able to claim by virtue of the statute. Jim Wilkens of OSU collaborated with Bruce Morrissey at Du Pont in drafting the assignment. Although it is unclear why, Wilkens claimed that OSU could not assign its rights directly to WSU or to Du Pont but could assign them to Okuley subject to the rights of those third parties. Therefore, on May 28, 1993, OSU executed an assignment that read as follows:

> Dear Dr. Okuley:
>
> Upon the recommendation of Dr. James Wilkens of our Office of Technology Transfer, and in view of the circumstance that your contributions to this invention were partly made while you were at Washington State University and that any contributions to this invention made while you were a visitor in Prof. Keith Davis' laboratory at Ohio State University were made by you in your capacity as an employee of Washington State University, The Ohio State University hereby waives any claim it might have in this invention and in any

> patent rights therein, and transfers the same to you, *subject to any rights of Washington State University or its research sponsor, E.I. du Pont de Nemours, Inc.*

(Ex. 31 to Def.'s Mot. Summ. J.)(emphasis added).[15]

Since this waiver, by its express terms, did not cut off Okuley's obligations that may have existed as a result of the sponsorship agreement with Du Pont or as a result of his employment relationship with WSU, the Court must therefore assess what rights Du Pont and WSU could rightfully claim in the FAD2 gene.

2. Du Pont and WSU

One of the central issues in this case is whether Dr. Okuley is obligated to assign his ownership rights in the FAD2 invention to Du Pont by virtue of the Research Collaboration Agreement between Dr. Browse and Du Pont. Okuley claims that he did not have a legal duty to assign his rights to Du Pont because the Research Collaboration Agreement was solely between Du Pont and Dr. Browse. Okuley essentially argues that, since he is not a party to the agreement, he is not bound by it. Furthermore, because no language in the agreement obligates those working under Dr. Browse's direction to assign patent rights to Du Pont, Okuley claims that this agreement could not give rise to a duty to assign his rights to Du Pont. Plaintiff contends that even if Okuley was not personally bound by the terms of the Research Collaboration Agreement, he is still obligated to

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[15] The Court notes that on the very same day Okuley received this assignment from OSU, he assigned all of his rights in the invention to Du Pont.

assign his rights to Du Pont because Washington State University's patent policy requires him to do so.

a. Research Collaboration Agreement

The Research Collaboration Agreement is in the form of a letter directed solely to Dr. Browse, and contains numerous references to "you," apparently referring only to Dr. Browse.[16] For example, paragraph 6 states that "you agree to . . . assign all rights and title to such ideas and improvement to Du Pont" and "you shall at our request execute all papers we deem necessary or advisable for the filing and prosecution of such patent applications. . ." However, paragraph 5(a) states, "You *and individuals working under your direction* shall not transfer or give any such Biological Material or any portion thereof to any third party without the prior written permission of Du Pont." In addition, paragraph 7 states, "you *and individuals working under your direction* shall not disclose to others before obtaining Du Pont's written consent any unpublished information concerning Du Pont's business and research activities. . ." (emphasis added).

Although the Research Collaboration Agreement is hardly a model of draftsmanship, the Court finds that the two references to individuals working under Dr. Browse's direction indicate that the parties clearly contemplated that Dr. Browse would not be working on this project all by himself, but would supervise others in accomplishing its goals. There is no dispute among the parties who executed the document that they intended that the entire Research

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[16] The Court notes that the word "you" may be a singular or plural pronoun. However, it the context of this agreement, it appears to apply only to Dr. Browse.

Collaboration Agreement would apply to all employees working under Dr. Browse's supervision. Although the language of the agreement appears to obligate only Dr. Browse to assign his rights in the invention and to execute all necessary paperwork in connection with the patent applications, the parties clearly contemplated that, if necessary, Dr. Browse would also direct those under his supervision to do the same.[17]

In the Court's view, despite what the parties to the agreement intended, basic contract law dictates that parties to an agreement normally have no authority to bind non-parties to its terms. To that extent, Dr. Okuley's argument has some merit. However, even if Dr. Okuley is not bound directly by the Research Collaboration Agreement, WSU did sign the sponsorship agreement, is a party to it, and is bound to abide by its terms. Dr. Okuley was a faculty member and employee of WSU. The university's Faculty Manual and Patent Policy provide the conduit necessary to impose upon Dr. Okuley the duty to execute the necessary assignments.

b. Washington State University Faculty Manual and Patent Policy

Both Du Pont and Dr. Okuley agree that Dr. Okuley, as an employee of Washington State University, was bound by the terms of the WSU Faculty Manual and the patent policy contained in it. Washington law recognizes the enforceability of contractual terms contained in employee handbooks. *Thompson v. St. Regis Paper Co.*, 102 Wn.2d 219, 685 P.2d

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[17] In this case, since Dr. Okuley voluntarily executed the assignment at Bruce Morrissey's request, Dr. Browse did not need to direct him to do so.

1081, 1086 (Wash. 1984).[18] The relevant portions of the patent policy read as follows:

> This patent policy applies to all University employees. For the purposes of this policy, "employee" shall be defined as any person receiving compensation for service, or any person volunteering services for the benefit of the University . . . All employees accept the terms of this policy as conditions of employment . . .
>
> This policy applies to potentially patentable discoveries and trade secrets which are developed using Washington State university equipment, supplies, facilities, employee time, or trade secret information . . . The University will hold ownership in patents . . .
>
> Where research has been sponsored by private industry or foundation, licensing of patents shall be negotiated between the sponsor and the University or its agent where appropriate . . . the University normally retains ownership of property developed under a sponsorship agreement and will negotiate

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[18] Since this Court's jurisdiction is based on diversity of citizenship, it must apply the choice of law rules of the forum state, Ohio. *Klaxon Co. v. Stentor Elec. Mfg. Co.*, 313 U.S. 487, 496, 61 S. Ct. 1020, 85 L. Ed. 1477 (1941). In cases involving a contract dispute, the laws of the state with the most significant relationship to the contract control. *Miller v. State Farm Mutual Auto Ins. Co.*, 87 F.3d 822, 824 (6th Cir. 1996). The Court finds that Washington has the most significant relationship to the Washington State University Faculty Manual; the Court will therefore apply Washington law.

rights to license the property. *The proprietary rights of the University and of the University's employees shall be subject to the agreement between the sponsor and the University*. Agreements with outside sponsors shall be approved by the Provost, Vice President--Business and Finance, and Vice Provost for Research or their designees.

In order to determine the rights of employees and the University, employees shall disclose all potentially patentable inventions and discoveries developed while employed at WSU to the Intellectual Property Committee for review. . .

Unless otherwise agreed with an outside sponsor, the University shall own the rights to all patentable property developed as a result of University employment . . .

The Intellectual Property Committee will determine whether the potentially patentable property is owned by the university, by the employee, jointly by the University and the employee, or by an outside sponsor. . .

The Intellectual Property Committee shall make its determination of ownership, or request additional time, within 45 days of full disclosure . . . If the Intellectual Property Committee fails to notify the employee in writing of determination of ownership within 50 days of full disclosure . . . . then the University's rights in the patentable property shall automatically become the property of the employee.

> After the determination by the Intellectual Property Committee . . . the employee shall execute documents of assignment to convey to the University, or its assignee, all of the employee's interest in the invention determined to be owned by the University and assist in obtaining, protecting, and maintaining patent rights.

(Ex. I to Pl.'s Mot. Summ. J.).

Since Okuley was being paid by WSU while he was working at Ohio State University, he is clearly subject to the terms of this patent policy. Under the terms of the policy, WSU clearly owns the rights to any patentable inventions developed by him, unless there is a preexisting agreement to the contrary. The patent policy clearly contemplates that the university and university employees may enter into sponsorship agreements with private entities, and may agree that the outside sponsor owns rights to patentable inventions developed as a result of those agreements. The university must approve these agreements but, once approved, the proprietary rights of everyone concerned become subject to the terms of that sponsorship agreement.

That is what happened in this case. Dr. Browse entered into a sponsorship agreement with Du Pont.[19] When WSU

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[19] Okuley claims that the Research Collaboration Agreement does not constitute a "sponsorship agreement" as that term is used in the patent policy because Du Pont provided only biological material, not any funding for the research. The Court does not view Du Pont's failure to provide research funding as significant. Dr. Browse testified that merely being given access to Du Pont's extensive library of tagged *Arabidopsis* mutants provided a

approved the terms, it became a party to the agreement and, with one exception, agreed to waive all rights that it would normally be able to claim in any inventions that were discovered as a result of that particular research. Specifically, it agreed that, unless its employees cloned the FAD2 gene in other oilseed species after Du Pont scientists had unsuccessfully attempted to do so for a period of nine months, Du Pont would hold legal title to all patentable inventions arising out of the agreement. According to the express terms of the patent policy, all proprietary rights of the university and university employees became subject to the terms of that Research Collaboration Agreement.

Dr. Okuley testified that he was aware, even before he accepted the job, that Browse was collaborating with Du Pont on this project. (Okuley Dep. at 37). Dr. Okuley discovered the FAD2 gene as a result of his employment at WSU. If he had not been employed by WSU as a post-doctoral researcher, he would not have had the opportunity to work on the Du Pont project and would not have had access to the biological material needed to make the discovery. Therefore, even though the Research Collaboration Agreement does not specifically obligate Dr. Okuley and others working under Dr. Browse's direction to assign their rights in patentable inventions to Du Pont, the patent policy does. The patent policy obligates Okuley to assign his rights to Washington State University; in turn, the Research Collaboration Agreement obligates Washington State University to waive those rights in favor of Du Pont.

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significant benefit. The agreement itself refers to Du Pont's "extremely high" financial investment in developing this library.

Dr. Okuley advances several additional reasons why he should not have to assign his rights in FAD2 to Du Pont: 1) since the FAD2 gene was discovered while he was using a research method contrary to that specified by Dr. Browse, he was acting outside the scope of his assigned duties, making the Research Collaboration Agreement inapplicable; 2) since Du Pont scientists failed to clone the corresponding gene in other oilseed crops within nine months after he first isolated it, legal title to the invention vested in WSU and, because of certain breaches of the Faculty Manual, title subsequently vested in him; 3) because the Intellectual Property Committee failed to determine who owned the FAD2 gene within forty-five days after disclosure of his invention, all ownership rights vested in him pursuant to the terms of the patent policy; and 4) WSU's failure to negotiate a license agreement with Du Pont constitutes a breach of WSU's employment agreement with him.[20] None of these arguments has any merit.

First, Dr. Okuley claims that he was acting outside the scope of his assigned duties when he discovered the FAD2 gene because he was not using the research method that Dr. Browse had directed him to use. In fact, neither Dr. Browse nor Du Pont were aware that Okuley had resumed research on line 658-75. Okuley claims that since he was not acting under Dr. Browse's "direction," the Research Collaboration Agreement does not apply to him. This argument is meritless. Although Dr. Browse was in charge of the project, and

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[20] The Court notes that the third and fourth claims were essentially rendered moot when the Court dismissed the Third Party Complaint against WSU on Eleventh Amendment grounds. However, to the extent Defendant claims that these alleged breaches by WSU still have an impact on ownership rights in the FAD2 gene, the Court will discuss them briefly.

although he told Okuley that he preferred that he concentrate his efforts on the low stringency method using the FAD3 gene as a probe, this does not mean that Okuley was acting outside the scope of his assigned duties. Dr. Okuley was attempting to isolate the FAD2 gene; this is the precise goal set forth in the Research Collaboration Agreement. Okuley was also using biological material provided by Du Pont for that exact purpose. The method by which he accomplished the desired result is not important.

Furthermore, Okuley was a post-doctoral researcher with specialized skills and knowledge. Certainly, he was given some autonomy to decide how to best achieve the desired result. At his deposition, Dr. Browse testified that he told Lightner and Okuley that "if they could pursue experimental strategies that would test the possibility further that the T-DNA was tagging the FAD2 gene in 658, then they had my blessing to do so." (Browse Dep. at 53). Browse also testified that, although he made his preferences known, he never expressly prohibited Lightner and Okuley from pursuing this particular line of research or indicated that they would suffer adverse consequences if they did. (Browse Dep. at 130-31). At Okuley's deposition, he described Browse's managerial style as "loose" and noted that his role "was basically to provide you the atmosphere where you could get research done and be productive. He gave me . . .latitude on determining a project to pursue." (Okuley Dep. at 88). The Court further notes that once Dr. Okuley was certain that he had isolated the FAD2 gene, Dr. Okuley immediately notified Dr. Browse and then, at Dr. Browse's request, sent a DNA sample to Du Pont. If Okuley truly believed he was acting outside the scope of his assigned duties, it is unlikely that he would have disclosed the information so readily to Browse and Du Pont. Based on the totality of the circumstances, the Court finds that no reasonable jury could find that Dr. Okuley

was acting outside the scope of his assigned duties simply because he decided to pursue further research on line 658-75.

This brings the Court to Okuley's next set of arguments, which arise out of conflicting interpretations of several key definitions contained in the Research Collaboration Agreement, specifically the terms "Primary DNA," "Secondary DNA," and "isolated." As an initial matter, the Court questions whether Okuley, a non-party to the agreement, has standing to raise these arguments when all parties to the agreement--Dr. Browse, Du Pont, and WSU--concur as to their intended meaning. The Court will nevertheless proceed to address Okuley's claims because their resolution is important to understanding the basis for his duty to execute the assignment.

The Research Collaboration Agreement sets forth definitions of primary and secondary DNA. "Primary DNA" is defined as "DNA isolated from *Arabidopsis* by the tDNA tagging method (mutant and corresponding wild type DNA)." Secondary DNA is defined as "DNA isolated from any source using the Primary DNA as a probe." Okuley presents expert testimony that, according to these definitions, the FAD2 gene is "secondary" DNA because he used primary DNA as a probe to screen the *Arabidopsis* cDNA library and isolate the FAD2 gene. Dr. Browse, WSU, and Du Pont, on the other hand, contend that the FAD2 gene which Okuley isolated is primary DNA; they also present expert testimony to support their position. Despite the difference of opinion among the experts, the Court finds that this is not a genuine issue of material fact precluding summary judgment in favor of Du Pont.

If, based on the expert testimony, a jury were to find that the FAD2 gene should be classified as primary DNA, Du

Pont would be the rightful owner; this is clearly spelled out in the agreement. On the other hand, if a jury were to find that the FAD2 gene should be classified as secondary DNA, the jury would then have to determine whether Du Pont scientists successfully cloned the corresponding gene in other oilseed crop species within nine months after Dr. Okuley isolated the FAD2 gene. Under the terms of the agreement, if Du Pont scientists accomplished this task within nine months, Du Pont would again clearly be the rightful owner. However, if they failed to accomplish the task within nine months, and university employees were later successful, WSU would be the rightful owner and would have to offer Du Pont the right of first refusal on an exclusive license.

This dispute centers on the meaning of the term "isolated." Based on the premise that FAD2 is secondary DNA, Okuley claims that since more than nine months passed from the time he first "isolated" the FAD2 gene until Du Pont scientists were able to clone corresponding genes in other species of plants, rights to the gene vested in WSU instead of Du Pont.[21] Although he did not know the significance of the event at the time, Okuley claims he actually "isolated" the FAD2 gene in *Arabidopsis* no later than December 9, 1991.[22] Since Du Pont scientists did not clone the corresponding genes in other species until October of 1992, he claims that rights to the gene vested in WSU, triggering the duty to offer Du Pont an exclusive license.

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[21] This argument forms the basis for Okuley's subsequent arguments that because WSU breached certain terms of the Faculty Manual, title in the invention vested in him.

[22] In fact, Okuley claims that Feldmann and Aegerter "isolated" the DNA before he ever arrived at WSU.

Du Pont, on the other hand, claims that Okuley did not "isolate" the FAD2 gene in *Arabidopsis* until September of 1992, and that its scientists successfully cloned the genes in other species within weeks after that. Du Pont claims that the FAD2 gene could not be considered "isolated" until Okuley knew for certain that he had discovered it and disclosed the invention to Du Pont. The Court agrees. No reasonable trier of fact could conclude that Okuley "isolated" the gene in December of 1991 as that term was intended by the parties to be construed. Knowledge of the isolation must be implied in this case. Okuley stated at his deposition that, at the time he rescued the single plasmid known as line 658-1, it was "absolutely certain that I did not know that I had a plasmid that encoded FAD2." (Okuley Dep. at 140). Certainly, if no one, including Okuley, realized that the gene had been isolated, no one would be able to use that information to clone corresponding genes in other species. To start the clock running before anyone realized the FAD2 gene had been isolated would be absurd. The Court therefore finds that the FAD2 gene was "isolated" in September of 1992 when Okuley had completed sufficient sequencing to know that he had cloned it. Since Du Pont scientists successfully cloned the gene in October or 1992, within weeks after Okuley disclosed his discovery to them, they were well within the nine month time period. Therefore, whether FAD2 is classified as "primary" or "secondary" DNA is irrelevant. Even if it is secondary DNA, no reasonable jury could find that Du Pont scientists failed to isolate the corresponding gene in other plant species within nine months after Dr. Okuley first isolated FAD2.

Okuley's claim that rights to the invention vested in WSU because Du Pont scientists failed to clone the corresponding gene in other plant species within nine months after he first isolated the FAD2 gene in *Arabidopsis* also fails for a second

reason. It simply does not make sense. The parties clearly contemplated that once a sought-after gene was isolated in *Arabidopsis*, Du Pont scientists would have nine months to clone the corresponding gene in other species. Only if this proved very difficult to accomplish would the university be given the opportunity to attempt to do the same. If the university was successful, rights to the invention would vest in WSU and it could pursue a licensing agreement with Du Pont. Even if a trier of fact found that Okuley "isolated" the gene more than nine months before Du Pont scientists were able to clone the corresponding gene in other species, the contract provision vesting rights in WSU is never triggered because no WSU employee, including Dr. Okuley, ever identified or cloned the FAD2 gene in any plant other than *Arabidopsis*.

In summary, whether FAD2 is classified as "primary" or "secondary" DNA is ultimately irrelevant because no reasonable jury could find that Du Pont scientist failed to isolate and clone the corresponding gene in other plant species within nine months after Dr. Okuley "isolated" it. The Court therefore finds, as a matter of law, that, pursuant to the terms of the Research Collaboration Agreement, Du Pont is the rightful owner of the FAD2 gene.

Dr. Okuley next contends that because the Intellectual Property Committee failed to determine who owned the FAD2 invention within forty-five days after his disclosure, ownership in the invention vested solely in him, and he therefore had no duty to assign his interest to Du Pont.[23]

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[23] Dr. Okuley classifies the committee's failure to make a determination as a "breach" of the patent policy. The Court takes issue with this label. The policy simply states that if no

Under the terms of the patent policy, Okuley clearly had a duty to disclose his invention to WSU. On January 12, 1993, Okuley sent a fax to Larry Simonsmeier, Director of Intellectual Property at WSU. The fax included a copies of the December 1989 Research Collaboration Agreement, an October 21, 1992 letter from Linda Floyd to Browse, Lightner, and Okuley requesting inventorship information, Okuley's October 31, 1992 response to that letter, and Linda Floyd's November 17, 1992 assessment letter naming Lightner and Yadav as inventors. (Ex. 90 to Def.'s Reply Mem.).

Du Pont claims this facsimile did not constitute "full disclosure" as required to trigger the forty-five day period because none of the letters contained specific information about the invention; Okuley claims that the information he sent was sufficient. The parties also dispute whether the existence of the sponsorship agreement negated the need for the Intellectual Property Committee to make a determination of ownership. The Court finds that these are not genuine issues of material fact.

Even if Okuley's correspondence was sufficient to trigger the forty-five day period, and even if the Intellectual Property Committee "breached" some duty by failing to notify him in writing within forty-five days of its determination of ownership, this is of no significance. The patent policy states that in the event of such a failure, only the *university's* rights vest in the employee. In this case, WSU never had any

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determination is made within the time allotted, ownership of the university's rights vests in the inventor. Since nothing in the policy requires the committee to take affirmative action, its failure to act in a timely manner does not necessarily constitute a "breach."

ownership rights in the invention because it approved the Research Collaboration Agreement, waiving all claims to inventions arising out of the agreement in favor of Du Pont. In short, since WSU had no ownership rights in the FAD2 gene, there was nothing to "vest" in Dr. Okuley, even if the committee failed to make a timely determination.

Finally, Okuley claims that WSU breached the employment agreement by failing to negotiate a licensing agreement with Du Pont.[24] Relevant portions of the patent policy state:

> Licensing the use of the property provides an opportunity for both income to the inventor and support for further University research . . . Where research has been sponsored by private industry or foundations, licensing of patents shall be negotiated between the sponsor and the University or its agent where appropriate. The University will strive to protect the financial interests of all . . . The University normally retains ownership of property developed under sponsorship agreements and will negotiate rights to license the property.

Nothing in the Faculty Manual requires WSU to negotiate a licensing agreement with corporate sponsors; it states that licensing agreements will be negotiated "where appropriate." The parties in this case determined that a licensing agreement would be "appropriate" only if Du Pont failed to clone corresponding genes in other oilseed crop species within nine

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[24] Okuley testified at his deposition that "it was my belief that I may have an obligation to assign it to Du Pont but I didn't have to assign it to them without compensation." (Okuley Dep. at 269).

months after the primary DNA was isolated, and Dr. Browse later succeeded in doing so. Since that condition never materialized, and WSU never obtained an ownership interest in the gene, there was no need for a licensing agreement. The Court finds, as a matter of law, that WSU had no duty to negotiate a licensing agreement with Du Pont; therefore, there was no breach, and WSU's failure to negotiate such an agreement has no impact on this ownership dispute.

In short, under the terms of the Research Collaboration Agreement, Du Pont is the rightful owner of the FAD2 gene. Dr. Okuley's duty to execute the assignment to Du Pont arises out of the interplay between Okuley's obligations under WSU's patent policy and WSU's approval of the Research Collaboration Agreement. None of the arguments presented by Dr. Okuley creates genuine issues of material fact precluding summary judgment on this issue.[25]

C. Was Okuley's assignment to Du Pont valid?

On May 28, 1993, Dr. Okuley executed an assignment transferring to Du Pont his "entire right, title, and interest in" the application for Letters Patent for his invention "Fatty Acid Desaturase Genes from Plants," and the "entire right, title, and interest in and to any and all. . . inventions . . . disclosed in the aforesaid application." (Ex. R to Pl.'s Mot. Summ. J.). Dr. Lightner executed a similar assignment in favor of Du Pont. Okuley and Lightner also executed Declarations and

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[25] The parties did not brief Du Pont's claim that Okuley also breached his common law duty to assign rights in his invention to his employer. Because the Court finds that Dr. Okuley did have a duty to assign his rights in the FAD2 invention to Du Pont by virtue of the WSU patent policy, and did breach that contractual duty, the Court need not discuss the common law duty claim.

Powers of Attorney enabling Du Pont to prosecute the application and conduct all business related to the patent.

Okuley now claims that his assignment is null and void because it was fraudulently induced. Okuley essentially alleges that Bruce Morrissey, in-house counsel for Du Pont, led him to believe that he was also acting as Okuley's attorney, and falsely informed Okuley that he had a duty to execute the assignment, intending that Okuley rely on his misrepresentation, and that Okuley did rely on that advice to his detriment. In the alternative, Okuley claims that since both parties mistakenly believed that he had a contractual duty to execute the assignment, the assignment is void under the doctrine of mutual mistake. Plaintiff denies the allegations of fraudulent misrepresentation and mutual mistake.

In order to determine the validity of the assignment, the Court must first determine the appropriate choice of law. As noted earlier in this Memorandum and Order, since this Court's jurisdiction is based on diversity of citizenship, it must apply the choice of law rules of the forum state, in this case, Ohio. *Klaxon*, 313 U.S. at 496. In a case involving a contract dispute, where the parties have not specified which state's law should govern, Ohio's choice of law rules dictate that the Court apply the laws of the state with the most significant relationship to the contract, and the law of the state where the contract was made presumptively controls. *Miller*, 87 F.3d at 824. Factors to be considered include: (1) the place of contracting; (2) the place of negotiating; (3) the place of performance; (4) the location of the subject matter of the contract; and (5) the domicile, residence, nationality, place of incorporation, and place of business of the parties. *National Union Fire Ins. Co. v. Watts*, 963 F.2d 148, 150 (6th Cir. 1992).

Plaintiff claims that the law of the State of Washington should govern because the underlying contracts, including the Research Collaboration Agreement and the WSU Faculty Manual were negotiated and entered into in Washington and that is where performance was contemplated. While this provided a sufficient basis for the Court to apply Washington law in interpreting the Research Collaboration Agreement and the WSU Faculty Manual, the document at issue here is the assignment. Defendant claims that Ohio law should be applied because he was residing in Ohio when he negotiated and executed the assignment.[26] The Court agrees that Ohio has the most significant relationship to the assignment. Although the alleged duty to execute the assignment was based on other contracts that were made in Washington, the assignment itself was negotiated and executed in Ohio and arose from a discovery made while Okuley was conducting research in a laboratory at The Ohio State University.

1. Fraudulent Inducement

Under Ohio law, where a litigant seeks to rescind a contract on the ground that it was induced by fraudulent misrepresentations, it must be proved by clear and convincing evidence: (1) that there were actual or implied representations of material matters of fact; (2) that such representations were false; (3) that such representations were made by one party to the other with knowledge of their falsity; (4) that they were made with intent to mislead the other party to rely thereon; and (5) that such party relied on such representations with a right to rely thereon. *Schulz v. Sullivan*, 92 Ohio App. 3d

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[26] In the alternative, Defendant claims that Delaware law should apply because that is where Du Pont is incorporated.

205, 209, 634 N.E.2d 680 (1993)(*citing Cross v. Ledford*, 161 Ohio St. 469, 120 N.E.2d 118 (1954)).

At issue here is whether Bruce Morrissey, Du Pont's in-house counsel, made a knowing, material misrepresentation when he informed Okuley that Okuley had a duty to execute the assignment. There is no dispute that the alleged misrepresentation was material. If Morrissey had not informed Okuley that he had a duty to execute the assignment, Okuley would not have done it. There is also no dispute that Okuley relied on the statement to his detriment.

However, Okuley's claim fails on at least three grounds. As to the second element, the Court has already discussed in great detail the fact that Okuley did have a duty to execute the assignment because Du Pont is the rightful owner of the FAD2 gene. Since Morrissey's representation concerning that duty was not false, Okuley's claim of fraudulent misrepresentation fails. This alone is sufficient grounds to deny summary judgment of Dr. Okuley's claim.

The claim also fails because, as to the third and fourth elements, Okuley has failed to present sufficient evidence that Morrissey made the statement to Okuley knowing that it was false, and with the intent to mislead him. Okuley claims that Morrissey knew that Okuley had no obligation to assign his rights because Du Pont drafted the agreement which imposed a duty to assign patent rights only on Dr. Browse. This argument is unavailing. The agreement contains language indicating that the parties contemplated that other researchers would be assisting Dr. Browse on the project. Since the WSU Faculty Manual grants all rights in intellectual property to the university, subject to outside sponsorship agreements, Morrissey reasonably construed the agreement to impose a duty on Okuley to execute the assignment. In fact, at the time

Morrissey requested that Okuley execute the assignment, everyone involved in the research project, including Dr. Okuley, was of the opinion that Okuley had a duty to execute the assignment because Du Pont was the rightful owner of the FAD2 gene. As additional evidence of Morrissey's knowledge that his representation was false, Okuley alleges that Du Pont refused to give him a copy of the Research Collaboration Agreement until 1995. However, he testified at his deposition that he had a copy of the agreement before he executed the assignment. (Okuley Dep. at 75-76). Since Dr. Okuley has presented no evidence, other than his subjective belief, that Morrissey made the alleged representation with knowledge of its falsity, or that he made the statement with the intent to mislead him, he has failed to satisfy the third and fourth elements.

In a related matter, Dr. Okuley also claims that Bruce Morrissey improperly permitted him to believe that he was acting as Okuley's personal legal counsel. Then, trusting that Morrissey was acting in Okuley's best interests, Okuley allegedly relied on Morrissey's representations concerning his duty to execute the assignment. Okuley first claims that he was led to believe that Morrissey was acting as his personal legal counsel because Okuley signed the Declaration and Power of Attorney which granted Linda Floyd, the Du Pont attorney who had initially worked on the patent application, "the power to prosecute this application and transact all business in the Patent and Trademark Office connected therewith." Later, when Morrissey sent Okuley another assignment to be executed in connection with the first CIP application, Okuley e-mailed Morrissey expressing concern about how time-consuming his continuing responsibilities might be in connection with the patent application. He also stated that he understood that it was Morrissey's personal opinion that he was bound by the Research Collaboration

Agreement. He then wrote, "If, as it states in the declaration, you are acting as my lawyer, I would appreciate your advising me on these concerns." Morrissey replied that Okuley's "obligation to sign stems from your previous contract with Washington State."

There is no evidence that Morrissey ever affirmatively told Okuley that he was personally representing him, or that he considered Okuley a "client" and was acting in his best interests. However, Morrissey also admits that, despite Okuley's expressed concerns, he never advised Okuley to retain his own counsel. (Morrissey Dep. at 46). Particularly in light of Okuley's statement that he believed Morrissey was "acting as my lawyer," Morrissey should have clarified that he was representing only Du Pont's interests. He should have told Okuley that, while Du Pont attorneys may have been given Power of Attorney to prosecute the patent, he was not acting as Okuley's personal legal counsel. However, despite Morrissey's failure to clarify the relationship between himself and Okuley, this alone cannot form the basis for a claim of fraudulent inducement.

Okuley has failed to present any evidence that Morrissey purposely permitted him to believe that he was representing Okuley's interests with the intent to mislead him. More importantly, Okuley did not justifiably rely on the alleged misrepresentation. This is true for two reasons. First, the Declaration and Power of Attorney clearly stated that it granted Du Pont attorneys only the power to *prosecute the patent application and transact business* in the Patent and Trademark Office. This is very different from agreeing to represent Okuley's best interests and give him professional legal advice concerning his obligations to execute an assignment. Dr. Okuley is a well-educated man and there is nothing in the record to indicate that he was not fully capable

of reading the Declaration and Power of Attorney and discerning the role that Du Pont attorneys would play.

Second, the Court seriously doubts the sincerity of Okuley's claim that he believed that Morrissey was acting as his personal attorney in all matters concerning the patent. Because Okuley's own actions indicate that he knew that he should not rely on Morrissey to represent his best interests, the Court finds that no reasonable jury could find that he was justified in his belief. Okuley testified that before he executed the first assignment, he considered obtaining his own counsel and made some effort to do so. A friend gave him the name of a patent attorney. (Ex. OO to Pl.'s Mem. Opp'n to Def.'s Mot. Summ. J.). He then attempted to reach the attorney but, after he was told the attorney was no longer with the firm, he made no effort to follow up. (Okuley Dep. at 217). He also testified that in 1994, he consulted another attorney who knew little about patent law but advised him not to sign anything. (Okuley Dep. at 218). Okuley's actions clearly indicate that he knew that Morrissey was not able to offer an objective legal opinion concerning his duty to execute the assignment. While Okuley's minimal efforts to find his own attorney may have been unsuccessful, this does not mean that he was justified in relying on Morrissey instead to protect his legal interests.

For these reasons, Dr. Okuley's failure to obtain competent legal counsel will not be considered as grounds for rescission of the assignment. Okuley claimed at his deposition that, at the time he executed the assignment, he had no idea that he was transferring all of his rights to Du Pont; he assumed the document was a license and relied on

Morrissey's representation that he had a duty to execute it.[27] (Okuley Dep. at 245). Again, Okuley is a well-educated man and there is no indication that he suffered from any disability which rendered him incapable of reading and understanding the document. Okuley does not claim that Morrissey represented the assignment to be something other than it was. It was clearly labeled an "Assignment" and clearly stated that Okuley was agreeing to "sell, assign, and transfer" to Du Pont his "entire right, title and interest in" FAD2. If he had questions about the legal effect of the document or his obligations under it, he should have consulted his own attorney before he signed it. He admitted that from the date he received the documents on May 12, 1993 until he executed them on May 28, 1993, he made no effort to seek legal advice. (Okuley Dep. at 247). For these reasons, the Court finds that Okuley's reliance on his alleged belief that Morrissey was acting as his personal attorney was not justifiable, and cannot form the basis for his claim that the assignment was fraudulently induced.

2) Mutual Mistake

In the alternative, Okuley claims that the assignment is void under the doctrine of mutual mistake. Under Ohio law, mutual mistake is a proper basis for rescission of a contract if it relates to a material aspect of the agreement. *Fada v. Information Systems & Networks Corp.*, 98 Ohio App. 3d 785, 790-91, 649 N.E.2d 904 (1994). As with fraudulent inducement, mutual mistake must be proved by clear and

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[27] It was only after he received the proposed assignment in connection with the first CIP that he did some research and learned the difference between a license and an assignment. (Okuley Dep. at 267-68).

convincing evidence. In this case, if both parties were under the mistaken belief that Okuley had a duty to execute the assignment, this could be sufficient grounds for rescission, because this would clearly be material. However, since the Court has already determined that Okuley did have a duty to execute the assignment, the doctrine of mutual mistake is inapplicable.

The Court has concluded that Defendant has failed to produce sufficient evidence from which a reasonable jury could conclude that the assignment is void either because it was fraudulently induced or under the doctrine of mutual mistake.

3) Due Diligence

Furthermore, Okuley did not act with due diligence in seeking rescission based on fraudulent misrepresentation or mutual mistake. He did not seek rescission until he filed his counterclaims in 1998, five years after he executed the assignment. In Ohio, unless a person seeking rescission of a contract on the ground of fraud exercises that right promptly upon discovering the fraud, the claim is barred. *Keyerleber v. Euclid Congregation of Jehovah's Witnesses*, 103 Ohio App. 423, 433, 143 N.E.2d 313 (1957); *Cross v. Ledford*, 161 Ohio St. 469, 474, 120 N.E.2d 118 (1954). Okuley claims that he did not discover the fraud until he hired an attorney in 1995. However, there is no evidence that he sought to rescind the assignment until he filed his counterclaims in 1998. Because he failed to seek rescission in a timely manner, his claims are now barred.

4) CIP Applications

Okuley claims that even if the original assignment is valid, it did not include within its scope the subject matter contained in the CIP applications for which he has refused to execute subsequent assignments. After Du Pont begin working in September of 1992 to clone the corresponding gene in other oilseed crops, he did some additional work on the FAD2 gene to confirm that he had, in fact, isolated the gene in *Arabidopsis*. Okuley claims that this transformation work created a new generalized claim, that FAD2 can be used to control the level of polyunsaturated fatty acids in plant oil, which formed the basis for the Du Pont scientists' specialized claims. Du Pont denies that this represents any new inventive contribution, since it was simply confirming what Okuley had already claimed--that he had isolated FAD2 in *Arabidopsis*.

An assignment which conveys the entire right, title, and interest in an invention includes "all alterations and improvements and all patents whatsoever, issued and extensions alike, to the extent of the territory specified in the instrument." *Hendrie v. Sayles*, 98 U.S. 546, 553-54, 25 L. Ed. 176 (1879). The CIP applications at issue are simply extensions of the original patent application filed in this case. Therefore, the Court need not determine whether Okuley's additional work constitutes a new generalized claim because, even if it did, he has a duty to assign his rights in that new claim to Du Pont for the same reasons discussed above.

IV. Conclusion

Until a patent issues, the Court has no jurisdiction to determine whether Dr. Okuley is the sole inventor of FAD2. Even if it had jurisdiction to consider the inventorship issue, Dr. Okuley has no standing to challenge the inclusion of Dr.

Lightner's name since Okuley has assigned his entire interest in the invention to Du Pont. Furthermore, because he waited five years to raise the issue, he is now equitably estopped from challenging the determination of inventorship.

The Court also finds as a matter of law that, under the terms of the Research Collaboration Agreement, Du Pont is the rightful owner of the FAD2 gene. The Ohio State University assigned all interest in the invention to Dr. Okuley, subject to the rights of WSU and Du Pont. Since WSU approved the Research Collaboration Agreement, and agreed that Du Pont would hold legal title to all inventions that arose from that agreement, Dr. Okuley, being bound by the terms of WSU's patent policy as defined in the Faculty Manual, has a duty to execute whatever documents are necessary in order for Du Pont to process the patent.

Finally, the Court finds that the assignment executed by Dr. Okuley on May 28, 1993 is valid. He has failed to show that it should be rescinded either because it was fraudulently induced or because the parties made a mutual mistake. His failure to seek rescission in a timely manner acts as a further bar to his claims. Because Dr. Okuley assigned his entire right, title, and interest in the invention to Du Pont, he must execute whatever additional assignments are necessary in order for Du Pont to process the Continuation-in-Part applications.

Based on the foregoing, the Court finds that: 1) Du Pont is entitled to a declaratory judgment that Dr. Okuley has no legal interest in the FAD2 gene; 2) as assignee of WSU's claims against Dr. Okuley, Du Pont is entitled to specific performance of Dr. Okuley's contractual obligation to assign his rights in the FAD2 gene to Du Pont, including his obligation to execute whatever documents are necessary in

order that Du Pont may prosecute the Continuation-in-Part applications; 3) Dr. Okuley is not entitled to a declaratory judgment that he is the sole inventor of the FAD2 gene, or any related inventions as set forth in the Continuation-in-Part applications, because this Court lacks jurisdiction to make that determination. But even if it had jurisdiction, the Court has found that, by virtue of the fact that Okuley has assigned his entire interest in the invention to Du Pont, he has no standing to challenge the named inventions. To that extent, Plaintiff's motion for summary judgment (Record at 48) is **GRANTED** and Defendant's motion for summary judgment (Record at 49) is **DENIED.**

IT IS SO ORDERED.

John D. Holschuh, Judge

United States District Court

JUDGMENT IN A CIVIL CASE

Judge Holschuh

Magistrate Judge King

Decision by Court. This action was decided by the Court without a trial or hearing.

IT IS ORDERED AND ADJUDGED that pursuant to the Memorandum and Order of December 21, 2000, summary judgment is GRANTED to plaintiff E.I. Du Pont De Nemours and Company and this action is terminated.

Date: December 21, 2000

APPENDIX D

IN THE UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF OHIO, EASTERN DIVISION

Case No. C2-97-1205

[Filed Nov. 3, 1997]

JUDGE HOLSCHUH
MAGISTRATE JUDGE KING

E.I. DU PONT DE NEMOURS AND COMPANY,
P.O. Box 80017
Wilmington, DE 19880
Plaintiff,

v.

DR. JOHN JOSEPH OKULEY
217 Fallis Road
Columbus, Ohio 43214,
Defendant.

COMPLAINT FOR DECLARATORY RELIEF AND SPECIFIC PERFORMANCE

Plaintiff E.I. du Pont de Nemours and Company ("DuPont"), by its attorneys, Squire, Sanders & Dempsey, LLP., for its complaint herein alleges upon knowledge as to itself and its own acts and upon information and belief as to the acts of others as follows:

Nature of the Action

1. This is an action for declaratory and other relief to determine conflicting claims of ownership to a patentable invention arising from university research sponsored and funded by DuPont. The invention in question was developed while defendant Dr. John Okuley ("Dr. Okuley") was employed as a post-doctoral researcher at Washington State University ("WSU"), which had a research collaboration contract with DuPont. In accordance with that agreement, WSU and all of the other WSU employees involved in the project duly assigned their rights in the invention to DuPont. Dr. Okuley executed an initial assignment in favor of DuPont for most aspects of the invention. However, he has repeatedly refused to execute a standard form assignment for the remaining aspects of the invention unless DuPont agrees to pay him royalties to which he is not legally entitled.

2. DuPont thus seeks a judicial declaration that Dr. Okuley has no rights to, or interest in, the remaining aspects of the invention. DuPont also seeks an order of specific performance directing Dr. Okuley to execute an immediate and unconditional assignment of his rights and interests in the invention to DuPont.

3. DuPont brings this action in its own right and as the assignee of causes of action previously held by WSU. DuPont also asserts standing to sue as a third party beneficiary of the

express and implied employment contract between Dr. Okuley and WSU.

Parties

4. Plaintiff DuPont is a corporation duly organized and existing under the laws of the State of Delaware with its principal place of business is in Wilmington, Delaware.

5. Dr. Okuley is a citizen and resident of the State of Ohio. He currently resides at 217 Fallis Road in Columbus, Ohio.

Jurisdiction and Venue

6. Jurisdiction of this Court is founded upon 28 U.S.C. §§ 1332. DuPont is a citizen of Delaware and Dr. Okuley is a citizen of Ohio. The action is thus between parties of diverse citizenship. The amount in controversy exceeds the sum of $75,000, exclusive of interest and costs.

7. Venue is proper in the Southern District of Ohio under 28 U.S.C. § 1391(a). Dr. Okuley resides and works in this district and a substantial part of the events giving rise to the claims for relief occurred in this district.

Background Allegations

8. The events which form the basis for this litigation reach back to 1989, when DuPont entered into a research collaboration agreement with WSU. Under the terms of this contract, DuPont agreed to collaborate with WSU to identify lipid variations in T-DNA-based Arabidopsis mutants. Specifically, WSU was to attempt to identify and clone genes that affect seed lipid composition (e.g., genes encoding fatty

acid desaturase, commonly known as "fad genes") from the Arabidopsis mutants made available to WSU by DuPont. DuPont agreed to fund the project and to provide proprietary "biological material" (including the Arabidopsis T-DNA mutants) for use by WSU.

9. In exchange for DuPont's investment, WSU agreed that DuPont (as corporate sponsor) would own all primary and secondary DNA isolated from the DuPont biological material (except in special cases which never arose), including any patentable inventions which might result from the research. WSU further agreed to assign to DuPont all of its rights to, and interest in, any patentable inventions, and to cause its employees to execute all papers deemed necessary by DuPont for the filing and prosecution of any such patent applications.

Dr. Okuley Joins WSU

10. From 1989 to 1991, most of the work on this project was done by Jonathan Lightner, a WSU graduate researcher working in the laboratory of Dr. John Browse (head of WSU's Institute of Biological Chemistry).

11. In November, 1991, Dr. Okuley enrolled as a post-doctoral researcher at WSU and began lab work on the DuPont-sponsored research project. At all relevant times, Dr. Okuley was an employee of WSU; he was paid a salary by the University and worked under the direct supervision of Dr. Browse.

12. At or about the time that Dr. Okuley began his employment with WSU, he was issued a WSU Faculty Manual. The Faculty Manual expressly stated that "[a]ll employees accept the terms of this policy as a condition of

employment." The Faculty Manual further imposed an affirmative duty on all faculty employees, including Dr. Okuley, to disclose "all potentially patentable inventions and discoveries developed while employed at WSU to the Intellectual Property Committee for review." The Faculty Manual also provided that unless otherwise agreed with an outside sponsor, WSU "shall own the right to all patentable property developed as a result of University employment."

Dr. Okuley Returns to Ohio State

13. In June or July 1992, Dr. Okuley moved to Columbus and was granted access as a "visitor" to laboratory facilities at the Ohio State University ("OSU"). At OSU, Dr. Okuley continued his work on the "fad genes" project using DuPont biological material brought with him from WSU. While conducting this work at OSU, Dr. Okuley remained an employee of WSU. WSU paid his salary and retained the right to supervise all aspects of his research.

The BB-1043 Patent Application

14. In the fall of 1992, DuPont determined that a potentially patentable invention had been created as a result of the "fad genes" project. In November 1992, DuPont filed with the U.S. Patent and Trademark Office a patent application for an invention called "Fatty Acid Desaturase Genes from Plants" ("the BB-1043 Application"). Dr. Lightner and Dr. Okuley were eventually listed as the co-inventors.

15. As expressly contemplated by the 1989 research collaboration agreement, DuPont, in May 1993, sought assignments from Dr. Lightner and Dr. Okuley. Both Dr. Lightner and Dr. Okuley executed a standard form assignment

which transferred to DuPont all of their rights as co-inventors, including their respective interests in "any and all applications for Letters Patent" in the invention disclosed in the BB-1043 application.

The OSU Assignment

16. At approximately the same time Dr. Okuley assigned his interest in the "fad genes" invention to DuPont, he also obtained from OSU a waiver of any claims OSU might otherwise have to the invention by virtue of Dr. Okuley's work in Columbus. The waiver letter specifically acknowledges that Dr. Okuley was an employee of WSU while he was working at the OSU lab in Columbus, and it transferred any and all rights OSU might otherwise have in the invention to Dr. Okuley "subject to any rights of Washington State University or its research sponsor, E.I. du Pont de Nemours, Inc."

The Expanded Patent Applications

17. In November 1993, DuPont filed with the U.S. Patent and Trademark Office a Continuation in Part Application ("CIP"), which augmented and expanded upon the BB-1043 application. The expanded application ("the BB-1043-A application"), enlarged the original disclosure with additional experiments and upgraded definitions. It also included expanded claims to additional secondary DNA isolated in new experiments. Dr. Okuley was not involved in the additional work disclosed in the expanded filing. The formal title of the patent application was also changed to "Genes for Microsomal Delta-12 Fatty Acid Desaturases and Related Enzymes from Plants."

18. In connection with the BB-1043-A application, DuPont again requested that Dr. Okuley sign a standard form assignment conveying his rights to DuPont. This time, however, Dr. Okuley did not execute the assignment immediately. After several weeks, he sent DuPont an altered assignment which changed the language of the original form so as to require DuPont to pay Dr. Okuley a "reasonable royalty" for use of the invention. The language of the form assignment was altered without prior notice to, or discussion with, DuPont. It was typed to create the misleading appearance that the changed terms were part of the standard form assignment. DuPont did not accept the altered assignment, and it declined to record the document with the Patent and Trademark Office.

19. In June 1994, a second expanded filing ("the BB-1043-B application") was made with the Patent and Trademark Office. This second CIP also expanded the scope of the original claims to cover additional DNA isolated in new experiments performed by DuPont scientists. Again, Dr. Okuley was not involved in the additional work disclosed in the second expanded filing.

20. DuPont repeatedly asked Dr. Okuley to execute a standard assignment in connection with the BB-1043-B application. He has repeatedly refused to do so, however, unless DuPont agrees to pay him a royalty upon any commercial exploitation of the patent.

21. Accordingly, despite repeated demands by DuPont, Dr. Okuley has yet to execute a full assignment of his rights to, and interest in, the invention disclosed in the BB-1043-A and BB-1043-B applications. Instead, Dr. Okuley has (through counsel) taken the position that he retains individual rights in the invention described in the BB-1043-A and BB-

10430-B applications. Dr. Okuley has further represented that he will not assign his rights to DuPont without the payment of a substantial royalty.

First Cause of Action
(Declaratory Judgment)

22. DuPont repeats and realleges each allegation contained in paragraphs 1 through 21 above as though it was fully set forth herein.

23. There presently exists a real and live controversy between DuPont and WSU as to who has superior rights to the inventions described in the BB-1043-A and BB-1043-B patent applications.

24. Pursuant to 28 U.S.C. § 2201, DuPont is entitled to a judgment declaring that Dr. Okuley has no rights to, or interests in, the inventions described in the BB-1043-A and BB-1043-B patent applications and that DuPont has sole title to this intellectual property through the research collaboration agreement with WSU. DuPont is also entitled to a judgment declaring that Dr. Okuley is legally and contractually obligated to assign to DuPont any and all of his rights to, and interests in, the inventions described in the BB-1043-A and BB-1043-B patent applications, immediately and without condition.

Second Cause of Action
(Breach of Contract)

25. DuPont repeats and realleges each allegation contained in paragraphs 1 through 24 above as though it was fully set forth herein.

26. This is a claim for breach of an employment contract asserted by DuPont as the assignee of claims previously held by WSU. DuPont thus stands in the shoes of WSU for purposes of asserting claims under the employment relationship between Dr. Okuley and WSU. DuPont also brings this claim as an intended third party beneficiary of the employment agreement between Dr. Okuley and WSU.

27. On or about April 1991, WSU entered into an employment contract with Dr. Okuley as a post-doctoral researcher assigned to work under Dr. Browse in the University's Institute of Biological Chemistry. The parties expressly incorporated into that employment contract the contents of the WSU Faculty Manual. By refusing to execute full and unconditional assignments of his rights in the BB-1043-A and BB-1043-B patent applications, Dr. Okuley has breached, and continues to breach, his express and implied contractual obligations to WSU as set forth in the WSU Faculty Manual.

28. As a direct and proximate result of Dr. Okuley's breaches of his contractual obligations, DuPont's ability to prosecute and develop the inventions described in the BB-1043-A and BB-1043-B applications have been, and will continue to be, impaired unless and until this Court issues appropriate relief. Accordingly, DuPont is entitled to an order of specific performance requiring Dr. Okuley to live up to the terms of his employment agreement with WSU and to execute appropriate assignments in favor of DuPont.

Third Cause of Action
(Breach of Common Law Duty)

29. DuPont repeats and realleges each allegation contained in paragraphs 1 through 28 above as though it was fully set forth herein.

30. Because Dr. Okuley was specifically employed by WSU to research and assist in the invention of the "fad acids" described in the BB-1043 patent application and its two subsequent CIP's, he had, and continues to have, a common law obligation to assign to WSU any and all rights in such invention. DuPont has standing to enforce WSU's rights (and its own rights) as the assignee of WSU's claims and under the research collaboration agreement between DuPont and WSU.

31. By virtue of Dr. Okuley's breach of his common law duty to assign his rights to, and interest in, the invention described in the BB-1043-A and BB-1043-B applications, DuPont is entitled to an order from this Court specifically enforcing its common law rights (acquired from WSU), and requiring Dr. Okuley immediately to execute a full and unconditional assignment of his rights to, and interest in, the invention described above.

WHEREFORE, plaintiff DuPont respectfully demands judgment against defendants as follows:

(a) a judicial declaration that (i) Dr. Okuley has no rights to, or interest in, any invention described in the BB-1043-A and BB-1043-B patent applications; (ii) Dr. Okuley has breached his contractual and common law duties to DuPont and WSU by refusing to execute an unconditional assignment of his rights and interest in the BB-1043-A and BB-1043-B

patent applications; and (iii) DuPont is legally entitled to such an assignment from Dr. Okuley forthwith;

(b) an order requiring Dr. Okuley to execute such an assignment unconditionally and forthwith;

(c) DuPont's costs herein; and

(d) such other relief as the Court deems just and proper.

/s/_____
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APPENDIX E

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION

Civil Action No. C2-97-1205

[Filed Feb. 17, 1998]

Judge Holschuh
Magistrate Judge King

E.I. Du PONT DE NEMOURS AND COMPANY,
Plaintiff,

v.

JOHN JOSEPH OKULEY, Ph.D.
Defendant, Counterclaimant,
and Third Party Plaintiff,

v.

E.I. Du PONT DE NEMOURS AND COMPANY,
Counterclaim Defendant,

and

WASHINGTON STATE UNIVERSITY)
c/o Attorney General, State of Washington)
Highway License Building)
1125 Washington Street, S.E.)
P.O. Box 40100)
Olympia, WA 98504-0100)
Third Party Defendant.)
)

DEFENDANT JOHN JOSEPH OKULEY'S ANSWER AND COUNTERCLAIM, AN D THIRD-PARTY COMPLAINT AGAINST WASHINGTON STATE UNIVERSITY

Defendant, John Joseph Okuley, Ph.D., for and in his Answer to Plaintiff's Complaint, does state as follows:

1. Defendant admits that this action is for declaratory judgment; that Defendant is an inventor of certain subject matter, the ownership of which is in controversy; that he was employed in a post-doctoral research capacity at Washington State University ("WSU"); that a certain assignment was executed by him in favor of Plaintiff; that he signed a second assignment in favor of Plaintiff which Plaintiff has refused to accept. Defendant, however, is without sufficient information to form a belief as to the truth of the remaining allegations of paragraph 1 not specifically admitted and, therefore, denies same.

2. Defendant admits that Plaintiff seeks a judicial declaration as alleged in paragraph 2; however, Defendant denies that Plaintiff is entitled to the judicial declaration that it seeks.

3. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 3 and, therefore, denies same.

4. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 4 and, therefore, denies same.

5. Defendant admits the allegations of paragraph 5.

6. Defendant admits that he is a citizen of the State of Ohio. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 6 and, therefore, denies same.

7. Defendant admits the allegations of paragraph 7.

8. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 8 and, therefore, denies same.

9. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 9 and, therefore, denies same.

10. Defendant denies the allegations of paragraph 10.

11. Defendant admits that he was a post-doctoral student at WSU and that he was paid by WSU as a research associate. Defendant denies the remaining allegations of paragraph 10, not specifically admitted.

12. Defendant admits that he was subject to the WSU Faculty Manual. Defendant is without sufficient information to

form a belief as to the truth of the remaining allegations of paragraph 12 and, therefore, denies same.

13. Defendant admits that he was given the right by The Ohio State University ("OSU") to conduct research at a laboratory facility owned and operated by OSU; that he worked on "fad genes" at OSU laboratory facilities; that WSU paid his salary while he worked at OSU laboratory facilities; and that he was still a WSU employee. Defendant denies the remaining allegations of paragraph 13, not specifically admitted.

14. As Defendant was not named as an inventor on the patent application referred to in paragraph 14 at its filing, Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 9 and, therefore, denies same.

15. Defendant was coerced into signing the assignment referred to in paragraph 15, and, thus, denies those allegations in paragraph 15. Further, Defendant is without sufficient information to form a belief as to the remaining allegations and, therefore, denies same,

16. Defendant admits the OSU letter referred to in paragraph 16, as attached hereto as Defendant's Exhibit DX-1. Defendant, however, denies the remaining allegations of paragraph 16 not specifically admitted.

17. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 17 and, therefore, denies same.

18. Defendant admits that he signed a second assignment in favor of Plaintiff which Plaintiff has refused to accept.

Defendant is without sufficient information to form a belief as to the truth of the remaining allegations of paragraph 18 not specifically admitted and, therefore, denies same.

19. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 19 and, therefore, denies same.

20. Defendant admits that Plaintiff has requested him to sign an assignment form in derogation of his ownership rights in his invention and that he has requested to be compensated by Plaintiff as consideration for him assigning his ownership rights in his invention. Defendant is without sufficient information to form a belief as to the truth of the remaining allegations of paragraph 20 not specifically admitted and, therefore, denies same.

21. With respect to paragraph 21 of Plaintiff's Complaint, Defendant repleads his answer in paragraph 20 above.

RESPONSE TO FIRST CAUSE OF ACTION

22. Defendant repeats and repleads his answers in paragraphs 1-21, *supra*.

23. Defendant is without sufficient information to form a belief as to the truth of the allegations of paragraph 23 and, therefore, denies same.

24. Defendant denies that Plaintiff is entitled to the judgment which it seeks.

RESPONSE TO SECOND CAUSE OF ACTION

25. Defendant repeats and repleads his answers in paragraphs 1-24, *supra.*

26. Defendant denies the allegations of paragraph 26.

27. Defendant admits that he was employed by WSU as a post-doctoral fellow, that he worked under Dr. John Browse at the Institute of Biological Chemistry, and that the WSU Faculty Manual was a condition of his employment agreement. Defendant denies the remaining allegations of paragraph 27 not specifically admitted.

28. Defendant denies the allegations of paragraph 28.

RESPONSE TO THIRD CAUSE OF ACTION

29. Defendant repeats and repleads his answers in paragraphs 1-28, *supra.*

30. Defendant denies the allegations of paragraph 30.

31. Defendant denies the allegations of paragraph 31.

32. Defendant denies all allegations contained in Plaintiff's Complaint not specifically admitted herein to be true.

AFFIRMATIVE DEFENSES

Defendant asserts the following affirmative defenses to Plaintiff, E.I. Du Pont de Nemours and Company's Complaint.

1. Defendant, Dr. Okuley, was employed by WSU as a research associate commencing November 18, 1991 under conditions which include the WSU Faculty Manual, assigned to the Institute of Biological Chemistry ("IBC") as set forth in Defendant's Exhibit DX-2. Dr. Okuley was not hired to invent, but rather to conduct research as a post-doctoral research associate.

2. Among other projects undertaken by Dr. Okuley, he worked on the du Pont project involving the identification and cloning of genes that affect lipid production composition from *Arabidopsis* mutants. Work on this project had been done by others at the IBC and by scientists employed by Plaintiff, some of whom were no longer working at the IBC.

3. Dr. Okuley learned later that the work done by the IBC on the project was regulated by a "Materials Transfer Agreement" dated December 14, 1989 between Plaintiff and Dr. John Browse, the head of the IBC. This agreement is attached as Defendant's Exhibit DX-3. This agreement does not obligate WSU nor its employees to assign any inventions that it makes thereunder, except for § 5(c).

4. Neither Dr. Okuley nor anyone else working on the project, to the best of Dr. Okuley's knowledge, were successful in identifying the FAD2 gene of interest prior to his departure for Ohio in about June 1992.

5. Dr. Okuley's continued work on the FAD2 gene project proved fruitless until August 1992 at which time Dr. Browse informed him that he was leaving town for 2 weeks and would discuss Dr. Okuley's "future" after his return.

6. Dr. Okuley had been expressly discouraged by Dr. Browse from investigating a certain approach to the FAD2 gene project. On his own initiative and directly contrary to Dr. Browse's instructions to him and outside the scope of his employment by WSU, Dr. Okuley attempted the approach that Dr. Browse had instructed him not to pursue because Dr. Okuley felt that his employment by WSU was in jeopardy.

7. Much to Dr. Okuley's surprise, he was able within about 2 weeks to identify the FAD2 gene of interest. At all relevant times in his successful identification of the FAD2 gene, Dr. Okuley was working alone and outside the scope of his authority as a WSU employee. Furthermore, Dr. Okuley was using OSU laboratory facilities, materials, analytical equipment, and the like, the cost of which was being underwritten by OSU.

8. Despite Dr. Okuley's success, he was not named as an inventor on the original patent application filed on his work although he supplied most of the data for such patent application. Instead, Plaintiff named an employee of Plaintiff and a WSU graduate student as the inventors.

9. When Dr. Browse and one of the inventors who had been an IBC employee complained about the inventorship determination, Plaintiff recanted and agreed to remove the du Pont inventor who had not worked at the IBC, thus ending up with Dr. Okuley and Dr. Lightner as named inventors.

10. Dr. Okuley then was informed by counsel for Plaintiff that he had to assign the invention to Plaintiff. Dr. Okuley also inquired of WSU as to ownership and was told that he should do what Plaintiff demanded.

11. Accordingly, Dr. Okuley executed an assignment to a first patent application under duress and without advice of counsel, having been taken advantage of by a large multinational corporation and his employer.

12. Upon information and belief, there may be more than one invention in controversy and to which Dr. Okuley is the sole inventor or a co-inventor. Thus, use of the term "invention" herein is not an admission that a single invention exists.

AFFIRMATIVE DEFENSE I

13. The invention, the ownership of which is in dispute, was made solely by Dr. Okuley while working at OSU and while working outside the scope of his assigned employment duties by WSU.

14. Thus, title never vested in WSU, and Plaintiff has no ownership rights in the invention.

AFFIRMATIVE DEFENSE II

15. The invention, the ownership of which is in dispute, was made solely by Dr. Okuley while working at OSU and, thus, was owned by OSU pursuant to O.R.C. § 3345.14.

16. OSU released all of its right, title, and interest in and to the invention to Dr. Okuley as stated in Defendant's Exhibit DX-1.

AFFIRMATIVE DEFENSE III

17. The assignment referred to in paragraph 15 of the complaint is void as having been entered by Dr. Okuley

under duress, by mistake, without benefit of counsel, and he was deliberately misled by both Plaintiff and by WSU with respect to his "obligation" to assign his invention to Plaintiff.

AFFIRMATIVE DEFENSE IV

18. The invention, the title to which is in dispute, is a "secondary homologous DNA" as defined in the Materials Transfer Agreement (Exhibit DX-3) wherein the FAD2 gene was cloned by Dr. Okuley after the nine (9) month period set forth in § 5c, whereupon title to the invention vested in WSU pursuant to § 5d with Plaintiff having an option to license the invention pursuant to § 5e.

19. Plaintiff has not licensed the invention as required in said § 5e.

20. WSU has failed to exercise its duty with respect to the invention as required in the WSU *Faculty Manual.* By the terms of such WSU *Faculty Manual,* then, Dr. Okuley owns the invention.

COUNTERCLAIMS OF DEFENDANT JOHN JOSEPH OKULEY, Ph.D. AGAINST PLAINTIFF E.I. DU PONT DE NEMOURS AND COMPANY,
AND
THIRD PARTY COMPLAINT AGAINST WASHINGTON STATE UNIVERSITY

JURISDICTION, PARTIES, NATURE OF ACTION

1. Defendant repeats and realleges paragraphs 4 and 5, inclusive, of Plaintiff's Complaint with respect to two of the parties. On information and belief, Third Party

Defendant Washington State University ("WSU") is an instrumentality of the State of Washington located in Pullman, Washington 99164-1802. Without the presence of WSU in this action, Dr. Okuley's rights to the invention(s) cannot be fully determined.

2. This Counterclaim/Third Party Complaint is for declaratory and other relief to vest in Defendant, Dr. Okuley full right, title, and interest to the invention in dispute.

3. Jurisdiction of this Court is founded upon 28 U.S.C. § 1332. This Court has jurisdiction over Plaintiff by virtue of the action in chief. This Court has jurisdiction over Third Party Defendant WSU by virtue of WSU, *inter alia*, having permitted Dr. Okuley to work in the State of Ohio as an employee and having permitted Plaintiff to sue in its stead in the action in chief before this Court. The amount in controversy exceeds the sum of $75,000, exclusive of interest and costs.

4. Venue is proper for the reasons set forth in paragraph 7 of the Complaint.

COUNT I

RECISSION OF ASSIGNMENT TO PLAINTIFF

5. Defendant repeats and realleges paragraphs 1 through 20, inclusive, of his Affirmative Defenses.

6. By virtue of the assignment referred to in paragraph 15 of the Complaint having been entered by Dr. Okuley under duress, by mistake, without benefit of counsel, and because Dr. Okuley was deliberately mislead by both

Plaintiff and by WSU with respect to his "obligation" to assign his invention to Plaintiff, such assignment is null and void.

COUNT II

DECLARATION OF TITLE TO INVENTION IN DEFENDANT

7. Defendant repeats and realleges paragraphs 5 and 6 of these Counterclaims and Third Party Complaint.

8. By virtue of the invention having been made by Dr. Okuley outside the scope of his employment duties and outside of the State of Washington, neither Plaintiff nor Third Party Defendant WSU have any ownership interest in the invention.

9. By virtue of ownership of the invention vesting in Dr. Okuley under the common law of the State of Ohio and by virtue of the release of OSU's rights in the invention, if any, to Dr.Okuley, Dr. Okuley is the owner of all of the right, title, and interest in and to the invention.

COUNT III

DECLARATION OF TITLE TO INVENTION IN DEFENDANT

10. Defendant repeats and realleges paragraphs 5 through 9, inclusive, of these Counterclaims and Third Party Complaint.

11. Even if Third Party Defendant WSU had an ownership interest in the invention, WSU has breached its

employment agreement with Dr. Okuley and pursuant to its terms, title to the invention now vests fully in Dr. Okuley.

COUNT IV

DECLARATION OF TITLE TO INVENTION IN DEFENDANT

12. Defendant repeats and realleges paragraphs 5 through 11, inclusive, of these Counterclaims and Third Party Complaint.

13. Even if Third Party Defendant WSU had an ownership interest in the invention, WSU failed to follow-up on the invention as required in the *Faculty Manual*, and pursuant to its terms, title to the invention now vests fully in Dr. Okuley.

COUNT V

DECLARATION OF TITLE TO INVENTION IN DEFENDANT

14. Defendant repeats and realleges paragraphs 5 through 13, inclusive, of these Counterclaims and Third Party Complaint.

15. The invention, the title to which is in dispute, is a "Secondary, heterologous DNA" as defined in the Materials Transfer Agreement (Exhibit DX-3) wherein the FAD2 gene was cloned by Dr. Okuley after the nine (9) month period set forth in § 5c, whereupon title to the invention vested in WSU with Plaintiff having an option to license the invention.

16. Plaintiff has not licensed the invention as required in said § 5e.

17. WSU has failed to exercise its duty with respect to the invention as required in the WSU *Faculty Manual*. By the terms of such WSU *Faculty Manual*, then, Dr. Okuley owns the invention.

COUNT VI

DECLARATION THAT DR. OKULEY IS THE SOLE INVENTOR

18. Defendant repeats and realleges paragraphs 5 through 17, inclusive, of these Counterclaims and Third Party Complaint.

19. By virtue of Dr. Okuley's work at OSU having been undertaken on his own initiative and without the assistance of any other individual, Dr. Okuley is the sole inventor, and hence owner, of the invention, the title to which is in dispute.

WHEREFORE, on its Defenses, Counterclaims, and Third Party Complaint, Defendant prays for the following relief:

(a) That Plaintiff's Complaint be dismissed with prejudice.

(b) That the assignment signed by him be declared null and void.

(c) That Defendant be declared to be the sole owner of the invention in dispute.

(d) That, should ownership be found in WSU, that WSU be declared as having breached its employment agreement with Defendant and, hence, title to the invention fully vests in Defendant.

(e) That, alternatively should ownership be found in WSU, WSU should be ordered to live up to the terms of its employment agreement with Defendant by entering into a license agreement for the invention and to account to Defendant for moneys earned thereunder.

(f) That Defendant recover his costs of this action, and such other and further relief as this Court may deem appropriate.

Date: February 17, 1998

Respectfully Submitted,
By:/s/_____

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APPENDIX F

(12) **United States Patent**
Lightner et al.

(10) **Patent No.: US 6,372,965 B1**
(45) **Date of Patent: *Apr. 16, 2002**

(54) GENES FOR MICROSOMAL DELTA-12 FATTY ACID DESATURASES AND HYDROXYLASES FROM PLANTS

(75) Inventors: **Jonathan Edward Lightner**, Marietta, PA (US); **John Joseph Okuley**, Columbus, OH (US); **William Hitz; Anthony John Kinney**, both of Wilmington, DE (US); **Luis Perez-Grau**, Davis, CA (US); **Narendra S. Yadav**, Chadds Ford, PA (US)

(73) Assignee: **E.I du Pont de Nemours and Company**, Wilmington, DE (US)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154 (a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/133,962**

(22) Filed: **Aug. 14, 1998**

Related U.S. Application Data

(63) Continuation of application No. 08/262,401, filed on Jun. 20, 1994, now abandoned, which is a continuation-in-part of application No. PCT/US93/09987, filed on Oct. 15, 1993, which is a continuation-in-part of application No. 07/977,339, filed on Nov. 17, 1992, now abandoned.

(51) **Int. Cl.**[7] **A01H 5/00**; C12N 5/04; C12N 15/82

(52) **U.S. Cl.** **800/298**; 800/281; 435/320.1; 435/419; 435/468; 536/23.6

(58) **Field of Search** 800/281,298; 435/69.1, 468, 419, 320.1; 536/23,6

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(List continued on next page.)

Primary Examiner—Elizabeth F. McElwain

(57) **ABSTRACT**

The preparation and use of nucleic acid fragments encoding fatty acid desaturase enzymes are described. The invention

permits alteration of plant lipid composition. Chimeric genes incorporating such nucleic acid fragments with suitable regulatory sequences may be used to create transgenic plants with altered levels of unsaturated fatty acids.

13 Claims, No Drawings

[1]

GENES FOR MICROSOMAL DELTA-12 FATTY ACID DESATURASES AND HYDROXYLASES FROM PLANTS

This is a continuation of application Ser. No. 08/262,401 [5], filed Jun. 20, 1994, now abandoned, which is a national filing continuation-in-part of PCT/US93/09987, filed Oct. 15, 1993, which is a continuation-in-part of 07/977,339, filed Nov. 17, 1992, now abandoned.

[10]

FIELD OF THE INVENTION

The invention relates to the preparation and use of nucleic acid fragments encoding fatty acid desaturase enzymes to modify plant lipid composition. Chimeric genes incorporat- [15] ing such nucleic acid fragments and suitable regulatory sequences may be used to create transgenic plants with altered levels of unsaturated fatty acids.

BACKGROUND OF THE INVENTION[20]

Plant lipids have a variety of industrial and nutritional uses and are central to plant membrane function and climatic adaptation. These lipids represent a vast array of chemical structures, and these structures determine the physiological and industrial properties of the lipid. Many of these struc- [25] tures result either directly or indirectly from metabolic

processes that alter the degree of unsaturation of the lipid. Different metabolic regimes in different plants produce these altered lipids, and either domestication of exotic plant species or modification of agronomically adapted species is [30] usually required to economically produce large amounts of the desired lipid.

Plant lipids find their major use as edible oils in the form of triacylglycerols. The specific performance and health attributes of edible oils are determined largely by their fatty [35] acid composition. Most vegetable oils derived from commercial plant varieties are composed primarily of palmitic (16:0), stearic (18:0), oleic (18:1), linoleic (18:2) and linolenic (18:3) acids. Palmitic and stearic acids are, respectively, 16- and 18-carbon-long, saturated fatty acids. [40] Oleic, linoleic, and linolenic acids are 18-carbon-long, unsaturated fatty acids containing one, two, and three double bonds, respectively. Oleic acid is referred to as a monounsaturated fatty acid, while linoleic and linolenic acids are referred to as poly-unsaturated fatty acids. The relative [45] amounts of saturated and unsaturated fatty acids in commonly used, edible vegetable oils are summarized below (Table 1):

TABLE 1 [50]

Percentages of Saturated and Unsaturated Fatty Acids in the Oils of Selected Oil Crops

	Saturated	Mono-unsaturated	Poly-unsaturated [55]
Canola	6%	58%	36%
Soybean	15%	24%	61%
Corn	13%	25%	62%

Peanut	18%	48%	34%
Safflower	9%	13%	78% [60]
Sunflower	9%	41%	51%
Cotton	30%	19%	51%

Many recent research efforts have examined the role that saturated and unsaturated fatty acids play in reducing the [65] risk of coronary heart disease. In the past, it was believed that mono-unsaturates, in contrast to saturates and poly-

[2]

unsaturates, had no effect on serum cholesterol and coronary heart disease risk. Several recent human clinical studies suggest that diets high in mono-unsaturated fat and low in saturated fat may reduce the "bad" (low-density lipoprotein) [5] cholesterol while maintaining the "good" (high-density lipoprotein) cholesterol (Mattson et al., Journal of Lipid Research (1985) 26:194–202).

A vegetable oil low in total saturates and high in mono-unsatutates would provide significant health benefits to [10] consumers as well as economic benefits to oil processors. As an example, canola oil is considered a very healthy oil. However, in use, the high level of poly-unsaturated fatty acids in canola oil renders the oil unstable, easily oxidized, and susceptible to development of disagreeable odors and [15] flavors (Gailliard, 1980, Vol. 4, pp. 85-116 In: Stumpf, P. K., Ed., The Biochemistry of Plants, Academic Press, New York). The levels of poly-unsaturates may be reduced by hydrogenation, but the expense of this process and the concomitant production of nutritionally questionable trans [20] [20] isomers of the remaining unsaturated fatty acids reduces the overall desirability of the hydrogenated oil (Mensink et

al., New England J. Medicine (1990) N323: 439–445). Similar problems exist with soybean and corn oils.

For specialized uses, high levels of poly-unsaturates can [25] be desirable. Linoleate and linolenate are essential fatty acids in human diets, and all edible oil high in these fatty acids can be used for nutritional supplements, for example in baby foods.

Mutation-breeding programs have met with some success [30] in altering the levels of poly-unsaturated fatty acid levels found in the edible oils of agronomic species. Examples of commercially grown varieties are high (85%) oleic sunflower and low (2%) linolenic flax (Knowles, (1980) pp. 35-38 In: Applewhite, T. H., Ed., World Conference on [35] Biotechnology for the Fats and Oils Industry Proceedings, American Oil Chemists' Society). Similar commercial progress with the other plants shown in Table 1 has been largely elusive due to the difficult nature of the procedure and the pleiotropic effects of the mutational regime on plant [40] hardiness and yield potential.

The biosynthesis of the major plant lipids has been the focus of much research (Browse et al., Ann. Rev. Plant Physiol. Mol. Biol. (1991) 42:467-506). These studies show that, with the notable exception of the soluble stearoyl-acyl [45]carrier protein desaturase, the controlling steps in the production of unsaturated fatty acids are largely catalyzed by membrane-associated fatty acid desaturases. Desaturation reactions occur in plastids and in the endoplasmic reticulum using a variety of substrates including galactolipids, [50] sulfolipids, and phospholipids. Genetic and physiological analyses of *Arabidopsis thaliana* nuclear mutants defective in various fatty acid desaturation reactions indicates that most of these reactions are catalyzed by enzymes encoded at single genetic loci in the plant. The analyses show further [55] that the different defects in fatty acid desaturation can have profound and different effects on the ultra-structural

morphology, cold sensitivity, and photosynthetic capacity of the plants (Ohlrogge, et al., Biochem. Biophys. Acta (1991) 1082:1-26). However, biochemical characterization of the [60] desaturase reactions has been meager. The instability of the enzymes and the intractability of their proper assay has largely limited researchers to investigations of enzyme activities in crude membrane preparations. These investigations have, however, demonstrated the role of delta-12 [65] desaturase and delta-15 desaturase activities in the production of linoleate and linolenate from 2-oleoyl-phosphatidylcholine and 2-linolcoyl-phosphatidylcholine,

[3]

respectively (Wang et al., Plant Physiol. Biochem. (1988) 26:777-792). Thus, modification of the activities of these enzymes represents an attractive target for altering the levels of lipid unsaturation by genetic engineering.

Nucleotide sequences encoding microsomal delta-9 [5] stearoyl-coenzyme-A desaturases from yeast, rat, and mice have been described (Stukey, et al., J. Biol. Chem. (1990) 265:20144–20149; Thiede, et al., J. Biol. Chem. (1986) 261:13230-13235; Kaestner, et al., J. Biol. Chem. (1989) 264:14755-1476). Nucleotide sequences encoding soluble [10] delta-9 stearoyl-acyl carrier protein desaturases from higher plants have also been described (Thompson, et al., Proc. Natl. Acad. Sci. U.S.A. (1991) 88:2578-2582; Shanklin et al., Proc. Natl. Acad. Sci. USA (1991) 88:2510-2514). A nucleotide sequence from coriander plant encoding a soluble [15] fatty acid desaturase, whose deduced amino acid sequence is highly identical to that of the stearoyl-acyl carrier protein desaturase and which is responsible for introducing the double bond in petrorselinic fatty acid (18:1, 6c) has also been described [Cahoon, et. al. (1992) Proc. Natl. Acad. Sci.[20] U.S.A. 89:11184-11188]. Two fatty acid desaturase genes from the cyanobacterium, Synechocystis PCC6803,

have been described: one encodes a fatty acid desaturase, designated desA, that catalyzes the conversion of oleic acid at the sn-1 position of galactolipids to linoleic acid. [Wada, et al., [25] Nature (1990) 347:200-203]; another encodes a delta-6 fatty acid desaturase that catalyzes the conversion of linoleic acid at the sn-1 position of galactolipids to y-linolenic acid (18:2, 6c,9c) [WO 9306712]. Nucleotide sequences encoding higher plant membrane-bound microsomal and plastid delta- [30] 15 fatty acid desaturases have also been described [WO 9311245]; Arondel, V. et. al. (1992) Science 258:1353-1355]. There is no report of the isolation of higher plant genes encoding fatty acid desaturases other than the soluble delta-6 and delta-9 desaturases and the membrane-[35]bound (microsomal and plastid) delta-15 desaturases. While there is extensive amino acid sequence identity between the soluble desaturases and significant amino acid sequence identity between the higher plant microsomal and plastid delta-15 desaturases, there is no significant homology [40] between the soluble and the membrane-bound desaturases. Sequence-dependent protocols based on the sequences encoding delta-15 desaturases have been unsuccessful in cloning sequences for microsomal delta-12 desaturase. For example, nucleotide sequences of microsomal or plastid [45] delta-15 desaturases as hybridization probes have been unsuccessful in isolating a plant microsomal delta-12 desaturase clone. Furthermore, while we have used a set of degenerate oligomers made to a stretch of 12 amino acids, which is identical in all plant delta-15 desaturases and highly [50] conserved (10/12) in the cyanobacterial des A desaturase, as a hybridization probe to isolate a higher plant nucleotide sequence, encoding plastid delta-12 fatty acid desaturase, this method has been unsuccessful in isolating the microsomal delta-12 desaturase cDNAs. Furthermore, there has [55] been no success in isolating the microsomal delta-12 desaturase by using the polymerase chain reaction products derived from

plant DNA, plant RNA or plant cDNA library using PCR primers made to stretches of amino acids that are conserved between the higher plant delta-15 and des A [60] desaturases. Thus, there are no teachings which enable the isolation of plant microsomal delta-12 fatty acid desaturases or plant fatty acid desaturase-related enzymes. Furthermore, there is no evidence for a method to control the level of delta-12 fatty acid desaturation or hydroxlylation in plants [65] using nucleic acids encoding delta-12 fatty acid desaturases or hydroxylases.

[4]

The biosynthesis of the minor plant lipids has been less well studied. While hundreds of different fatty acids have been found, many from the plant kingdom, only a tiny fraction of all plants have been surveyed for their lipid [5] content (Gunstone, et al., Eds., (1986) The Lipids Handbook, Chapman and Hall Ltd., Cambridge). Accordingly, little is known about the biosynthesis of these unusual fatty acids and fatty acid derivatives. Interesting chemical features found in such fatty acids include, for [10] example, allenic and conjugated double bonds, acctylenic bonds, trans double bonds, multiple double bonds, and single double bonds in a wide number of positions and configurations along the fatty acid chain. Similarly, many of the structural modifications found in unusual lipids (e.g., [15] hydroxylation, epoxidation, cyclization, etc.) are probably produced via further metabolism following chemical activation of the fatty acid by desaturation or they involve a chemical reaction that is mechanically similar to desaturation. Many of these fatty acids and derivatives having such [20] features within there structure could prove commercially useful if an agronomically viable species could be induced to synthesize them by introduction of a gene encoding the appropriate desaturase. Of particular interest are vegetable

oils rich in 12-hydroxyoctadeca-9-enoic acid (ricinoleic [24] acid). Ricinoleic acid and its derivatives are widely used in the manufacture of lubricants, polymers, cosmetics, coatings and pharmaceuticals (e.g., see Gunstone, et al., Eds., (1986) The Lipids Handbook, Chapman and Hall Ltd., Cambridge). The only commercial source of ricinoleic acid is castor oil [30] and 100% of the castor oil used by the U.S. is derived from beans grown elsewhere in the world, mainly Brazil. Ricinoleic acid in castor beans is synthesized by the addition of an hydroxyl group at the delta-12 position of oleic acid (Galliard & Stumpf (1966) J. Biol. Chem. 241: 5806-5812). [35] This reaction resembles the initial reaction in a possible mechanism for the desaturation of oleate at the delta-12 position to linoleate since dehydration of 12-hydroxyoctadeca-9-enoic acid, by an enzyme activity analogous to the hydroxydecanoyl dehydrase of *E. coli* [40] (Cronan et al, (1988) J. Biol. Chem. 263:4641-4646), would result in the formation of linoleic acid. Evidence for the hydroxylation reaction being part of a general mechanism of enzyme-catalyzed desaturation in eukaryotes has been obtained by substituting a sulfur atom in the place of carbon [45] at the delta-9 position of stearic acid. When incubated with yeast cell extracts the thiostearate was converted to a 9-sulfoxide (Buist et al. (1987) Tetrahedron Letters 28:857-860). This sulfoxidation was specific for sulfur at the delta-9 position and did not occur in a yeast delta-9- [50] desaturase deficient mutant (Bulst & Marecak (1991) Tetrahedon Letters 32:891-894). The 9-sulfoxide is the sulfur analogue of 9-hydroxyoctadecastearate, the proposed intermediate of stearate desaturation.

Hydroxylation of oleic acid to ricinoleic acid in castor [55] bean cells, like microsomal desaturation of oleate in plants, occurs at the delta-12 position of the fatty acid at the sn-2 position of phosphatidylcholine in microsomes (Bafor et al., (1991) Plant Physiol 280:507-514). Furthermore, castor

oleate delta-12 hydroxylation and plant oleate microsomal [60] delta-12 desaturation are both inhibited by iron chelators and require molecular oxygen [Moreau & Stumpf (1981) Plant Physiology 67:672-676; Somerville, C. (1992) MSU-DOE Plant Research Laboratory Annual Report]. These biochemical similarities in conjunction with the observation that [65] antibodics raised against cytnchrome b_5 completely inhibit the activities of both oleate delta-12 desaturation in safflower microsomes and oleate delta-12 hydroxylase in castor

[5]

microsomes [Somerville, C. (1992) MSU-DOE Plant Research Laboratory Annual Report] comprise strong evidence that the hydroxylase and the desaturase are functionally related. It seems reasonable to assume, therefore, that the nucleotide sequence encoding a plant delta-12 desaturase [5] would be useful in cloning the oleate hydroxylase gene from castor by sequence-dependent protocols. For example, by screening a castor DNA library with oligomers based on amino acid regions conserved between delta-12 desaturases, or regions conserved between delta-12 and [10] other desaturases, or with oligomers based on amino acids conserved between delta-12 desaturases and known membrane-associated hydroxylases. It would be more efficient to isolate the castor oleate hydroxylase cDNA by combining the sequence dependent protocols with a "differential" library [15] approach. One example of such a difference library would be based on different stages of castor seed development, since ricinoleic acid is not synthesized by very young castor seeds (less than 12 DAP, corresponding to stage I and stage II seeds in the scheme of Greenwood & Bewley, Can. J. Bot. [20] (1982) 60:1751-1760), in the 20 days following these early stages the relative ricinoleate content increases from 0% to almost 90% of total seed fatty

acids (James et al. Biochem. J. (1965) 95:448-452, Canvin. Can. J. Biochem. Physiol. (1963) 41:1879-1885). Thus it would be possible to make a [25] cDNA "difference" library made from mRNA present in a stage when ricinoleic acid was being synthesized at a high rate but from which mRNA present in earlier stages was removed. For the earlier stage mRNA, a stage such as stage II (10 DAP) when ricinoleic acid is not being made but when [30] other unsaturated fatty acids are, would be appropriate. The construction of libraries containing only differentially expressed genes is well known in the art (Sargent. Meth. Enzymol. (1987) 152:423-432). Assembly of the free ricinoleic acid, via ricinoleoyl-CoA, into triacylglycerol is [35] readily catalyzed by canola and safflower seed microsomes (Bafor et al., Biochem J. (1991) 280:507-514, Wiberg et al. 10th International Symposium on the Metabolism, Structure & Function of Plant Lipids (1992), Jerba, Tunisia) and ricinoleic acid is removed from phosphatidylcholine by a [40] lipase common to all oilseeds investigated. Thus, expression of the castor bean oleate hydroxylase gene in oil crops, such as canola seeds and soybeans, would be expected to result in an oil rich in triglycerides containing ricinoleic acid.

SUMMARY OF THE INVENTION [45]

Applicants have discovered a means to control the nature and levels of unsaturated fatty acids in plants. Nucleic acid fragments from cDNAs or genes encoding fatty acid desaturases are used to create chimeric genes. The chimeric genes [50] may be used to transform various plants to modify the fatty acid composition of the plant or the oil produced by the plant. More specifically, one embodiment of the invention is an isolated nucleic acid fragment comprising a nucleotide sequence encoding a fatty acid desaturase or a fatty acid [55] desaturase-related enzyme with an amino acid identity of

50%, 60%, 90% or greater respectively to the polypeptide encoded by SEQ ID NOS:1, 3, 5, 7, 9, 11, or 15. Most specifically, the invention pertains to a gene sequence for plant microsomal delta-12 fatty acid desaturase or [60]desaturase-related enzyme. The plant in this embodiment may more specifically be soybean, oilseed Brassica species, Arabidopsis thaliana, castor, and corn.

Another embodiment of this invention involves the use of these nucleic acid fragments in sequence-dependent proto-[65]cols. Examples include use of the fragments as hybridization probes to isolate nucleotide sequences encoding other fatty

[6]

acid desaturases or fatty acid desaturase-related enzymes. A related embodiment involves using the disclosed sequences for amplification of RNA or DNA fragments encoding other fatty acid desaturases or fatty acid desaturase-related [5] enzymes.

Another aspect of this invention involves chimeric genes capable of modifying the fatty acid composition in the seed of a transformed plant, the gene comprising nucleic acid fragments related as defined to SEQ ID NOS:1, 3, 5, 7, 9, or [10] 15 encoding fatty acid desaturases or SEQ ID NOS:11 encoding a desaturase or desaturase-related enzyme operably-linked in suitable orientation to suitable regulatory sequences. Preferred are those chimeric genes which incorporate nucleic acid fragments encoding microsomal delta-12 [15] fatty acid desaturase or desaturase-related enzymes.

Yet another embodiment of the invention involves a method of producing seed oil containing altered levels of unsaturated fatty acids comprising: (a) transforming a plant cell with a chimeric gene described above; (b) growing [20] sexually mature plants from the transformed plant cells of step (a); (c) screening progeny seeds from the sexually mature plants of step (b) for the desired levels of unsaturated fatty

acids, and (d) processing the progeny seed of step (c) to obtain seed oil containing altered levels of the unsaturated [25] fatty acids. Preferred plant cells and oils are derived from soybean, rapeseed, sunflower, cotton, cocoa, peanut, safflower, coconut, flax, oil palm, and corn. Preferred methods of transforming such plant cells would include the use of Ti and Ri plasmids of Agrobacterium, electroporation, and [30] high-velocity ballistic bombardment.

The invention also is embodied in a method of RFLP breeding to obtain altered levels of oleic acids in the seed oil of oil producing plant species. This method involves (a) making a cross between two varieties of oil producing plant [35] species differing in the oleic acid trait; (b) making a Southern blot of restriction enzyme digested genomic DNA isolated from several progeny plants resulting from the cross; and (c) hybridizing the Southern blot with the radiolabelled nucleic acid fragments encoding the fatty acid desaturases or [40]desaturase-related enzymes.

The invention is also embodied in a method of RFLP mapping that uses the isolated microsomal delta-12 desaturase cDNA or related genomic fragments described herein.

The invention is also embodied in plants capable of [45] producing altered levels of fatty acid desaturase by virtue of containing the chimeric genes described herein. Further, the invention is embodied by seed oil obtained from such plants.

BRIEF DESCRIPTION OF THE SEOUENCE [50]DESCRIPTIONS

The invention can be more fully understood from the following detailed description and the Sequence Descriptions which form a part of this application. The Sequence Descriptions contain the three letter codes for amino acids as [55] defined in 37 C.F.R. 1.822 which are incorporated herein by reference.

SEQ ID NO:1 shows the 5' to 3' nucleotide sequence of 1372 base pairs of the Arabidopsis thaliana cDNA which encodes microsomal delta-12 desaturase. Nucleotides 93-95 [60] and nucleotides 1242-1244 are, respectively, the putative initiation codon and the termination codon of the open reading frame (nucleotides 93-1244). Nucleotides 1-92 and 1245-1372 are, respectively, the 5' and 3' untranslated nucleotides.

[65] SEQ ID NO:2 is the 383 amino acid protein sequence deduced from the open reading frame (nucleotides 93-1244 in SEQ ID NO:1.

[16]

basis of unsuccessful attempts in using delta-15 fatty acid nucleotide sequences as hybridization probes to isolate nucleotide sequences encoding microsomal delta-12 fatty acid desaturase, the overall homology at the nucleotide level [5] between microsomal delta-12 fatty acid desaturase (SEQ ID NO:1) and the nucleotide sequences encoding the other three desaturases is poor (ranging between 43% and 48%). At the amino acid level too, the microsomal delta-12 fatty acid desaturase (SEQ ID NO:2) is poorly related to cyanobacte- [10] rial des A (less than 24% identity) and the plant delta-15 desaturases (less than 39% identity).

While the overall relatedness between the deduced amino acid sequence of the said invention and the published fatty acid desaturases is limited, more significant identities are [15] observed in shorter stretches of amino acid sequences in the above comparisons. These results confirmed that the T-DNA in line 658-75 had interrupted the normal expression of a fatty acid desaturase gene. Based on the fatty acid phenotype of homozygous mutant line 658-75, Applicants concluded that [20] SEQ ID NO:1 encoded the delta-12 desaturase. Further, Applicants concluded that it was the microsomal delta-12 desaturase, and not the chloroplastic delta-12 desaturase, since: a) the mutant phenotype was expressed strongly in the

seed but expressed poorly, if at all, in the leaf of line 658-75, [25] and b) the delta-12 desaturase polypeptide, by comparison to the microsomal and plastid delta-15 desaturase polypeptides [WO 9311245], did not have an N-terminal extension of a transit peptide expected for a nuclear-encoded plastid desaturase.

[30] Plasmid p92103 was deposited on Oct. 16, 1992 with the American Type Culture Collection of Rockville, Md. under the provisions of the Budapest Treaty and bears accession number ATCC 69095.

[35]Expression Of Microsomal Delta-12 Fatty Acid Desaturase In Arabidopsis Fad2-1 Mutant To Complement Its Mutation In Delta-12 Fatty Acid Desaturation

[40] To confirm the identity of SEQ ID NO:1 (Arabidopsis microsomal delta-12 fatty acid desaturase cDNA) a chimeric gene comprising of SEQ ID NO:1 was transformed into an Arabidopsis mutant affected in microsomal delta-12 fatty acid desaturation. For this, the ca. 1.4 kb Eco RI fragment [45] containing the cDNA (SEQ ID NO:1) was isolated from plasmid p92103 and sub-cloned in pGA748 vector [An et. al.(1988) Binary Vectors. In: Plant Molecular Biology Manual. Eds Gelvin, S. B. et al. Kluwer Academic Press], which was previously linearized with Eco RI restriction [50] enzyme. In one of the resultant binary plasmid, designated pGA-Fad2, the cDNA was placed in the sense orientation behind the CaMV 35S promotor of the vector to provide constitutive expression.

Binary vector pGA-Fad2 was transformed by the freeze/ [55]thaw method [Holsters et al. (1978) Mol. Gen. Genet. 163:181-187] into Agrobacterium tumefaciens strain R1000, carrying the Ri plasmid pRiA4b from Agrobacterium

rhizogenes [Moore et al., (1979) Plasmid 2:617-626] to result in transformants R1000/pGA-Fad2.

[60] Agrobacterium strains R1000 and R1000/pGA-Fad2 were used to transform Arabidopsis mutant fad2-1 [Miquel, M. & Browse, J. (1992) Journal of Biological Chemistry 267:1502-1509] and strain R1000 was used to transform wild type Arabidopsis. Young bolts of plants were sterilized [65] and cut so that a single node was present in each explant. Explants were inoculated by Agrobacteria and incubated at 25.degree. C. in the dark on drug-free MS minimal organics

[17]

medium with 30 g/L sucrose (Gibco). After four days, the explants were transferred to fresh MS medium containing 500 mg/L cefotaxime and 250 mg/ml carbenicillin for the counterselection of Agrobacterium. After 5 days, hairy roots derived from R1000/pGA-Fad2 transformation were excised [5] and transferred to the same medium containing 50 mg/ml kanamycin. Fatty acid methyl esters were prepared from 5-10 mm of the roots essentially as described by Browse et al., (Anal. Biochem. (1986) 152:141-145) except that 2.5% H.sub.2 SO.sub.4 in methanol was used as the methylation reagent and samples were heated for 1.5 h at 80.degree. C. to effect the [10] methanolysis of the seed triglycerides. The results are shown in Table 3. Root samples 41 to 46, 48 to 51, 58, and 59 are derived from transformation of fad2-1 plants with R1000/pGA Fad2; root samples 52, 53, and 57 were derived from transformation of fad2-1 plants with R1000 and serve as [15] controls; root sample 60 is derived from transformation of wild type Arabidopsis with R1000 and also serves as a control.

TABLE 3 [20]

Fatty acid Composition in Transgenic Arabidopsis fad2-1 Hairy Roots Transformed with Agrobacterium R1000/pGA-fad2

Sample	16:0	16:1	18:0 [25]
41	24.4	1.8	1.7
42	25.6	3.7	1.3
43	23.6	-	1.6
44	24.4	1.3	4.6
45	20.7	-	8.1 [30]
46	20.1	-	1.8
48	26.1	2.9	2.1
49	30.8	1.0	2.4
50	19.8	1.9	3.3
51	20.9	1.1	5.0
58	23.5	0.3	1.4
59	22.6	0.6	1.4 [35]
52, cont.	12.3	-	2.6
53, cont.	20.3	9.1	2.2
57, cont.	10.4	2.4	0.7
60, WT	23.0	1.7	0.8

TABLE 3-Continued [20]

Fatty acid Composition in Transgenic Arabidopsis fad2-1 Hairy Roots Transformed with Agrobacterium R1000/pGA-fad2

Sample	18:1	18:2	18:3 [25]
41	5.0	29.4	33.8
42	20.0	22.0	27.5
43	7.2	27.6	36.1
44	16.0	18.1	33.6
45	44.7	11.8	14.8
46	7.5	33.7	36.0 [30]
48	9.5	17.6	33.4
49	8.7	18.7	31.1
50	27.7	21.8	24.4
51	13.7	25.0	32.1
58	3.6	22.1	45.9 [35]
59	2.8	29.9	40.4
52, cont.	64.2	4.6	16.4
53, cont.	55.2	1.7	9.2
57, cont.	65.9	3.8	12.7
60, WT	6.0	35.0	31.8

These results show that expression of Arabidopsis [40] microsomal delta-12 desaturase in a mutant Arabidopsis lacking delta-12 desaturation can result in partial to complete complementation of the mutant. The decrease in oleic acid levels in transgenic roots is accompanied by increases in the levels of both 18:2 and 18:3. Thus, overexpression of this gene in other oil crops, especially canola, which is a close relative of Arabidopsis and which naturally has high levels of 18:1 in seeds, is also expected to result in higher levels of 18:2, which in conjunction with the overexpression of the microsomal delta-15 fatty acid desaturase will result in very high levels of 18:3. [50]

Using Arabidopsis Microsomal Delta-12 Desaturase cDNA as a Hybridization Probe to Isolate Microsomal Delta-12 Desaturase cDNAs from Other Plant Species [55]

Evidence for conservation of the delta-12 desaturase sequences amongst species was provided by using the Arabidopsis cDNA insert from pSF2b as a hybridization probe to clone related sequences from Brassica napus, and soybean. Furthermore, corn and castor bean microsomal [60] delta-12 fatty acid desaturase were isolated by PCR using primers made to conserved regions of microsomal delta-12 desaturases.

Cloning of a Brassica napus Seed cDNA Encoding Seed Microsomal Delta-12 Fatty Acid Desaturase [65]

For the purpose of cloning the Brassica napus seed cDNA encoding a delta-12 fatty acid desaturase, the cDNA insert

[103]

What is claimed is:

1. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a plant enzyme selected from the group consisting of a delta-12 desaturase and a delta-12 hydroxylase wherein said isolated nucleic acid fragment [25] hybridizes to one of the nucleotide sequences set forth in SEQ ID NOS:1, 3, 5, 7, 9, 11, and 15 under one of the following sets of conditions:

(a) hybridization in 50 mM Tris, pH 7.6, 6.times.SSC, 5.times.Denhardt's, 0.5% sodium dodecyl sulfate (SDS), [30] 100 .mu.g denatured calf thymus DNA at 50.degree. C. and wash twice with 2.times.SSC, 0.5% SDS at room temperature for 15 min [35] each, then wash twice with 0.2.times.SSC, 0.5% SDS at room temperature for 15 min each and then wash twice with 0.2.times.SSC, 0.5% SDS at 50.degree. C. for 15 min each;

(b) hybridization in 6.times.SSPE, 5.times.Denhardt's solution, 0.5% sodium dodecyl sulfate (SDS), 5% dextran sulfate, 100 .mu.g denatured calf thymus DNA at 50.degree. C. and wash twice with 2.times.SSC, 0.5% SDS at room [40] temperature for 15 min each, then wash twice with 0.2.times.SSC, 0.5% SDS at room temperature for 15 min each and then wash twice with 0.2.times.SSC, 0.5% SDS at 50.degree. C. for 15 min each; or

(c) hybridization in 50% formamide, 5.times.SSPE, 1% sodium [45] dodecyl sulfate (SDS), 1% Denhardt's Reagent, 100 .mu.g denatured salmon sperm DNA at 42.degree. C. and wash twice with 2.times.SSPE, 0.2% SDS at 42.degree. C. for 15 min each, then wash twice with 0.2.times.SSPE, 0.2% SDS at 55.degree. C. for 30 min each. [50]

2. The isolated nucleic acid fragment of claim 1 wherein said fragment is isolated from an oil-producing plant species.

3. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding a delta-12 fatty acid hydroxylase. [55]

4. A chimeric gene comprising the nucleic acid fragment of claim 3 operably linked to suitable regulatory sequences.

5. A chimeric gene comprising the nucleic acid fragment of claim 1 operably linked to suitable regulatory sequences.

6. Plants comprising in their genome the chimeric gene of [60] claim 4 or claim 5.

7. An isolated nucleic acid fragment comprising a nucleic acid sequence encoding an enzyme selected from the group consisting of a delta-12 desaturase and a delta-12 hydroxylase wherein the amino acid sequence comprising said enzyme [65] contains at least one of the following amino acid sequences selected from the group consisting of:

[104]

AIPPHCF, AWXXYW, HECGH, LLVPY, WKYSHR, and SHRRHH.

8. An isolated nucleic acid fragment encoding an enzyme selected from the group consisting of a delta-12 desaturase [25] and a delta-12 hydroxylase wherein said isolated nucleic acid fragment encodes a protein comprising any one of the amino acid sequences set forth in SEQ ID NOS:2, 4, 6, 8, 10 or 12.

9. An isolated nucleic acid fragment encoding an enzyme [30] selected from the group consisting of a delta-12 desaturase and a delta-12 hydroxylase wherein said isolated nucleic acid fragment hybridizes to the isolated nucleic acid fragment of claim 8 under one of the following sets of conditions:

(a) [35] [hybridization in 50 mM Tris, pH 7.6, 6.times.SSC, 5.times.Denhardt's, 0.5% sodium dodecyl sulfate (SDS), 100 .mu.g denatured calf

thymus DNA at 50.degree. C. and wash twice with 2.times.SSC, 0.5% SDS at room temperature for 15 min each, then wash twice with 0.2.times.SSC, 0.5% SDS at room temperature for 15 min each and then wash [40] twice with 0.2.times.SSC, 0.5% SDS at 50.degree. C. for 15 min each;

(b) hybridization in 6.times.SSPE, 5.times.Denhardt's solution, 0.5% sodium dodecyl sulfate (SDS), 5% dextran sulfate, 100 .mu.g denatured calf thymus DNA at 50.degree. C. [45] and wash twice with 2.times.SSC, 0.5% SDS at room temperature for 15 min each, then wash twice with 0.2.times.SSC, 0.5% SDS at room temperature for 15 min each and then wash twice with 0.2.times.SSC, 0.5% SDS at 50.degree. C. for 15 min each; or

(c) [50] hybridization in 50% formamide, 5.times.SSPE, 1% sodium dodecyl sulfate (SDS), 1% Denhardt's Reagent, 100 .mu.g denatured salmon sperm DNA at 42.degree. C. and wash twice with 2.times.SSPE, 0.2% SDS at 42.degree. C. for 15 min each, then wash twice with 0.2.times.SSPE, 0.2% SDS at 55.degree. C. [55] for 30 min each.

10. Seeds of the plant of claim 6.

11. The isolated nucleic acid fragment of claim 7, 8 or 9 wherein said fragment is isolated from an oil-producing plant species.

12. [60]The chimeric gene comprising the nucleic acid fragment of claim 7, 8 or 9 operably linked to suitable regulatory sequences.

13. The isolated nucleic acid fragment of claim 7, 8 or 9 comprising a nucleic acid sequence encoding a plant [65] microsomal delta-12 fatty acid desaturase.

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